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THE FOUNDRY

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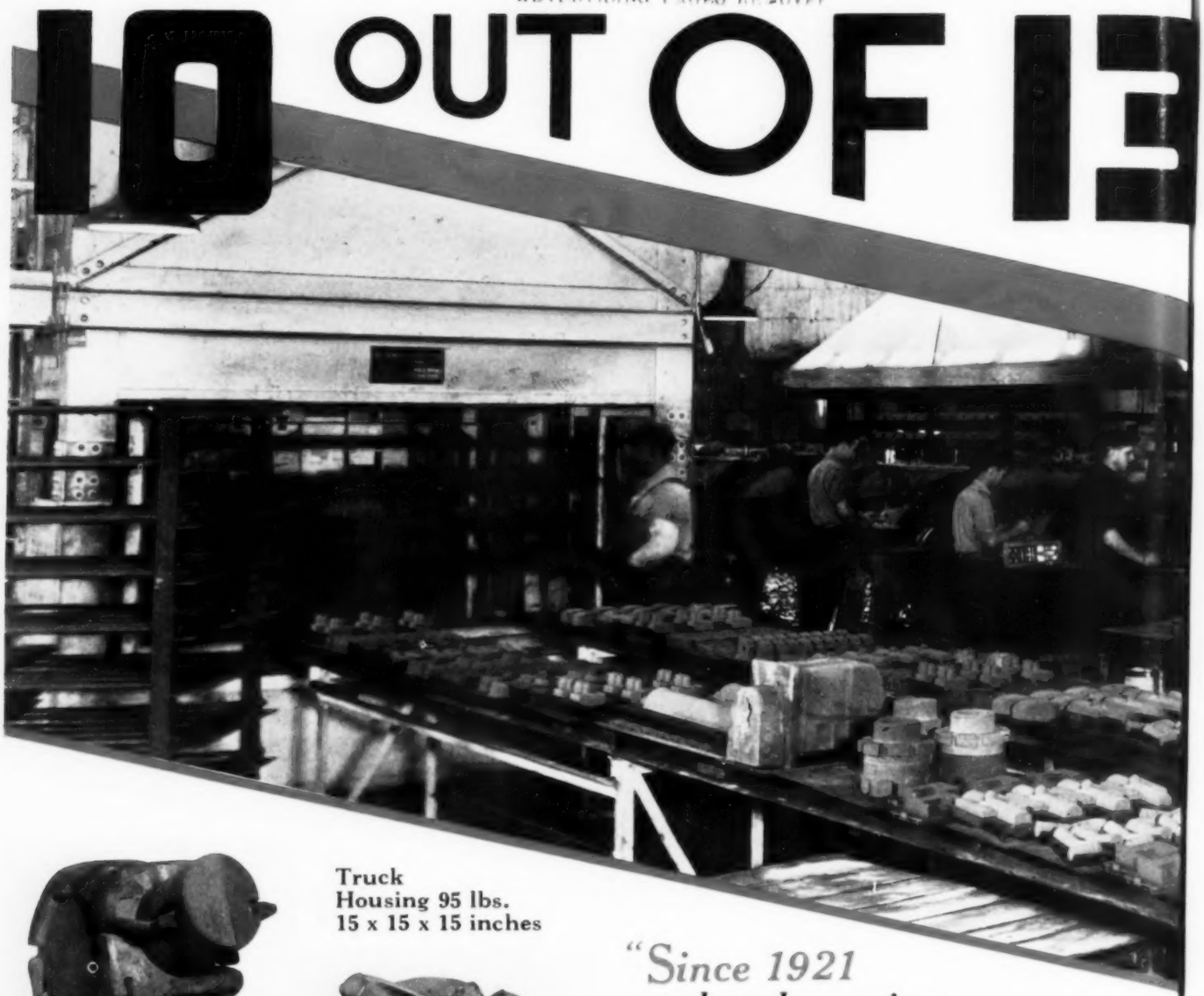

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EDITORIAL

Meeting Stimulates Industry To Meet New Demands

THE entire foundry industry is indebted to the officers and directors of the American Foundrymen's association, the national office staff, the officers and members of the Chicago chapter, the many authors of papers and other participants in the technical sessions, and to the several hundred manufacturers of equipment and supplies exhibiting at Chicago, for one of the most successful and valuable conventions and exhibitions yet staged under the banner of the association. The fact that 14,500 foundrymen inspected the magnificent foundry and allied industries exhibition at the International Amphitheatre during the course of the week proved an exceptional interest in an industry constantly striving to improve both practices and product.

The 1940 convention and exhibition will stimulate an industry already confident of its own business future. Trends which have developed during the past year toward the replacement of obsolete equipment with modern machines, and the building of new plants to replace old shops, should be accelerated. Likewise, those who participated in the annual business meeting of the association and heard the splendid addresses of President Washburn and Charles E. Wilson, must feel the urge to further the training of young men for lives of useful service in the foundry industry.

Organization of a new patternmaking division of the association, as authorized by the board of directors at Chicago, is a most important step in the service of the A.F.A. to the foundry industry. While it is recognized universally that no casting can be better than the pattern from which it is made, not enough co-operative effort has been directed toward correlating problems of both the foundry and patternshop to the end that all patterns may meet exactly the requirements of modern foundry practice. As in all movements of this kind, much assistance will be necessary from those modern pattern shops now serving the industry in such an excellent manner, if the technique of the entire patternmaking industry is to be raised.

Special features at the exhibition deserving of particular mention include the beautiful exhibit of castings utilized chiefly in the various methods of transportation, registrations of old timers, and the operating foundry prepared under the auspices of the Junior Foundrymen of America and the Chicago Public schools. Report of Vice President C. E. Hoyt that the association membership had reached the all time record of 3214 just prior to the opening of the convention indicates a greater realization on the part of foundrymen of the important contributions of the A. F. A. to foundry progress. Through the excellent work of the membership committee, functioning during the convention, and the further efforts of the individual chapters, that total should increase materially in the near future.

Armament Requires Castings

RECENT request of President Roosevelt for over a billion dollars to finance an adequate armament program climaxes a gradual change of opinion regarding the need of strengthening our national defenses. While sentiment is overwhelming in favor of our bending every effort to keep clear of the calamity in Europe, it now is recognized by the vast majority of citizens that this purpose may be accomplished best through strengthening every branch of the defense service.

Because of the basic character of castings, any program of armament extension necessarily will increase demands placed on foundries. Many shops today are engaged in the preparedness program by building an organization and establishing practices through "educational orders" for certain war essentials. Other foundries are producing castings in quantities for various classes of war materiel. Need of all classes of castings will increase materially as the new program gets under way.

Frank G. Steinebach
Editor

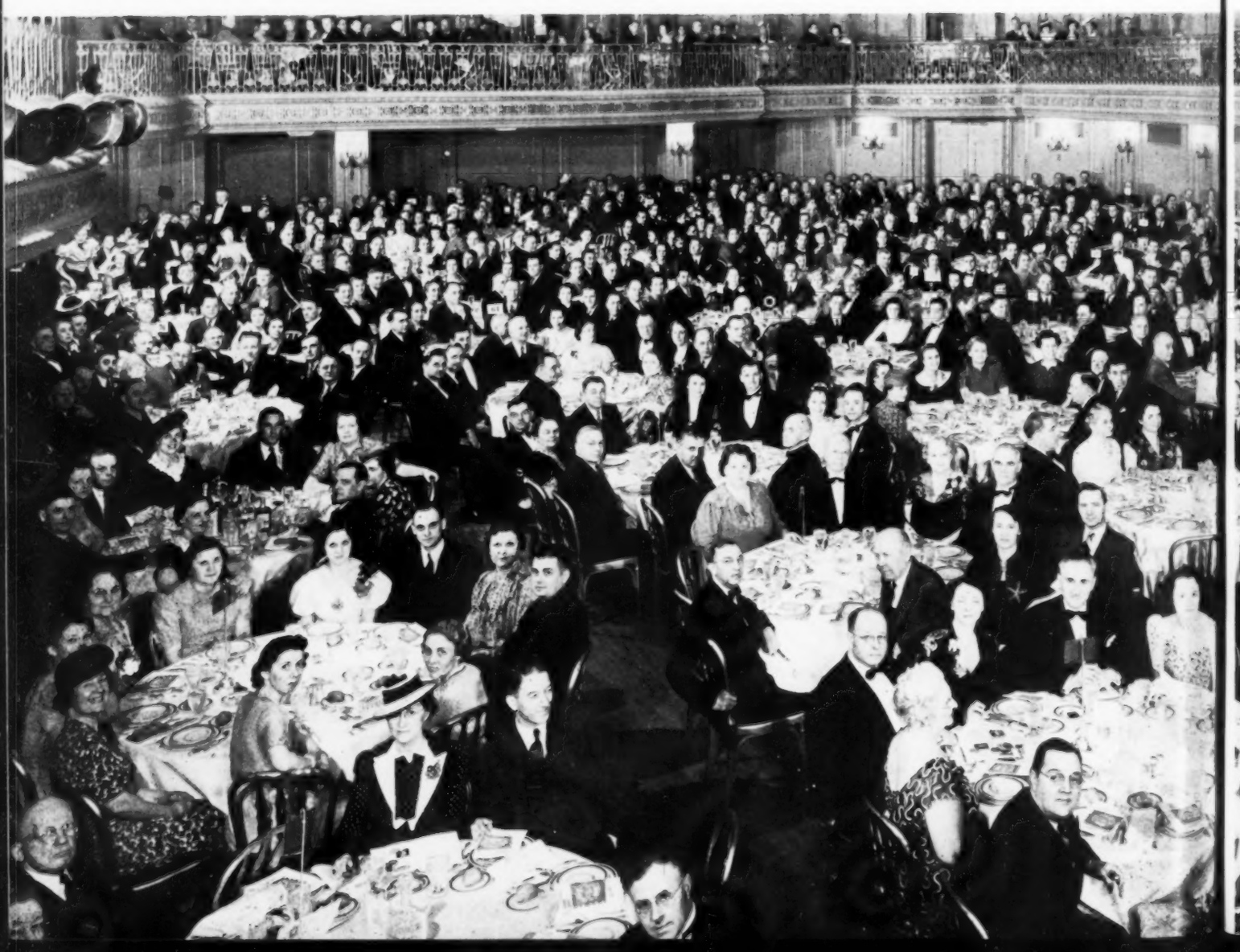
Lester N. Shannon
President A.F.A.

Herbert S. Simpson
Vice President A.F.A.

GREAT CONVENTION

Industry

OF THE



SHOWS *Confident* FUTURE

IN AN atmosphere electrified by a continuous parade of screaming headlines telling of tension, crises and invasion in Europe, members and guests of the American Foundrymen's association gathered in Chicago, May 4 to 10 to review past progress in the foundry industry and to make the necessary preparations to meet any future demands for castings which may develop in a troubled world. The entire convention was successful in every way from the well attended preview for Chicago district foundrymen on Saturday, May 4, through the following week of exhibits, technical and shop practice sessions, plant visitations, social events, and other activities. Approximately 7500 registered for the annual convention and exhibition, and an additional 7000 foundrymen from Chicago and the surrounding territory visited the exhibition on the opening Saturday, thus bringing the total convention attendance to 14,500, a record for the association. General impressions gathered from conversations throughout the week indicated the foundry industry is confident of continued improvement in business, and of its ability to meet any future demands.

The annual business meeting of the association was held at the Palmer House Wednesday morning, May 8 with Henry S. Washburn, president of the association, presiding. W. J. Corbett, Atlas Steel Casting Co., Buffalo, and chairman of the prenominating committee, presented the following nominating committee which will nominate association officers for 1941: C. V. Nass, Fairbanks, Morse & Co., Beloit, Wis.; H. F. McFarlin, Lunkenheimer Co., Cincinnati; F. A. Melmoth, Detroit Steel Casting Co., Detroit; R. K. Glass, Republic Steel Corp., Buffalo; alternates: M. F. Doty, Clark Equipment Co., Buchanan, Mich.; Fred L. Wolf, Ohio Brass Co., Mansfield, O.; Martin Pohlman, Pohlman Foundry Co., Buffalo; S. C. Wasson, National Malleable & Steel Casting Co., Indianapolis.

In his annual report to the association, the executive vice president, C. E. Hoyt, stated that the total membership of the association just prior to the opening of the convention was 3214, the largest in the history of the organization, and that a number of members had been added during the convention through the effective efforts of a special membership committee. Mr. Hoyt discussed the progress which has been made in connection with A.F.A. chapters, research, committee activities, publications, etc. He also stated that invitations to hold the 1941 convention of the association had been received from Atlantic City, Baltimore, Boston, Buffalo, New York, Pittsburgh, St. Louis, San Francisco and Washing-

Attendance at the annual banquet held in the ballroom of the Palmer House, Thursday evening, May 9, reached a new record with approximately 900 present. Photo by Kaufmann & Fabry Co., Chicago

ton with probably other cities in prospect.

Robert E. Kennedy, secretary of the association, read the report of the 1940 nominating committee, and as no further nominations had been received, President Washburn declared the following officers elected for the 1940-41 fiscal year: President, Lester N. Shannon, vice president and works manager, Stockham Pipe Fittings Co., Birmingham, Ala.; vice president, Herbert S. Simpson, president, National Engineering Co., Chicago; directors to serve 3 years, George Cannon, vice president, Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich.; B. D. Claffey, manager, gray iron and aluminum division, General Malleable Corp., Waukesha, Wis.; Harold J. Roast, vice president, Canadian Bronze Co. Ltd., Montreal, Que., Canada; L. P. Robinson, director, core oil sales, Werner G. Smith Co., Cleveland; and Henry S. Washburn, president, Plainville Casting Co., Plainville, Conn. President Washburn then introduced the new officers.

Upon recommendation of the board of directors, life memberships in the A.F.A. were presented to G. A. T. Long, Pickands, Mather & Co., Chicago, the only man who has attended all conventions of the A.F.A.; F. K. Vial, Griffin Wheel Co., Chicago, and recipient of the J. H. Whiting gold medal for 1940; F. A. Melmoth, Detroit Steel Casting Co., Detroit, and recipient of the Joseph S. Seaman gold medal for

Upper left—Ben D. Fuller, Whitehead Bros. Co., Lakewood, O., (left) with 59 years service in the foundry industry, and George A. T. Long, Pickands Mather & Co., Chicago, (right) with 68 years service signing the roster for "Old-Timers" buttons. Left below—Some of the ladies at the reception and tea given on Monday, May 6. Center below—More registrants for "Old-Timers" buttons. Extreme right—Another view taken at reception and tea. Photos by Kaufmann & Fabry Co., Chicago

Above, left and right—Candid camera shots taken around the exhibition. Photos courtesy Sterling Farmer, Sand Products Corp., Cleveland. Right below—Part of the crowd awaiting the opening of the exhibition at the International Amphitheatre on Preview Day, Saturday, May 4

1940; Harry W. Dietert, president, Harry W. Dietert Co., Detroit, and recipient of the W. H. McFadden gold medal for 1940; and Henry S. Washburn, Plainville Casting Co., Plainville, Conn., and retiring president of the association. N. K. B. Patch, recipient of the John A. Penton gold medal for 1940 was voted a life member of the association in 1931 after serving as president of the A.F.A.

In the annual presidential address, H. S. Washburn cited excerpts from the remarks of previous A.F.A. presidents to indicate the steady advance in foundry technology.

At the Buffalo convention in 1901, President Jones emphasized the rise in the prestige of the foundry industry—nationally and internationally. In 1909 at Cincinnati, President Anthes commented on the need of handbooks to disseminate knowledge of foundry practice widely. Molding machines had appeared and Major Anthes stated that this development would intensify the need for sand control.

In 1910 at Detroit, President Waterfall commented upon the increasing willingness of foundrymen to share technical information. The following year, in Pittsburgh, President Speer bemoaned the bad business conditions and predicted that the income tax would become a thorn in the flesh of industry.

The predictions of these and other early presidents have been borne out, declared Mr. Washburn. Much of the present activity of the association is being addressed to problems foreseen by them many years ago.

Today, he said, the rapid pace of technical improvement constitutes a challenge (*Please turn to page* 92)

SPLENDID *Progress in*

FOUNDRY executives and operators from all parts of the United States and Canada visited Chicago May 4 to 10 and inspected one of the largest, best arranged and most colorful exhibitions of foundry equipment and supplies ever staged. Approximately 14,500 representatives of the castings and allied industies passed through the International Amphitheatre during the annual convention of the American Foundrymen's association, and inspected the many new developments made in foundry equipment and supplies since the previous exhibition two years ago. Every type of machine or material utilized in the production of castings was on display in a setting designed to be most attractive and interesting to the convention visitor.

During the week of the exhibition the Junior Foundrymen of America, and the Chicago public schools jointly operated a foundry in the South hall of the amphitheatre, where high school and trade school boys made molds, melted metal and poured castings. The large floor space occupied in that activity was equipped with molding machines and benches, sand preparing equipment including mullers and screens,

EXHIBIT REVEALS
Equipment and Supplies

sand testing equipment, a core oven, a melting furnace and other materials. The excellent work performed by the boys operating the foundry attracted considerable attention and commendation. The demonstration was arranged and supervised by Prof. Roy W. Schroeder, Crane Technical high school, Chicago, in cooperation with the foundry and forge instructors group of the Chicago schools and with the assistance of a number of foundry equipment manufacturers.

The most attractive and interesting display of castings ever to be included at an annual exhibition of the association was presented in the North wing through the efforts of a committee of the A. F. A. The display was designed primarily to acquaint foundrymen and engineers with the progress which has been made in the foundry industry during recent years and featured the application of castings in transportation on water, land and in the air. The display was built around a beautiful exhibit of a Pontiac motor which opened and closed to show the motor block and other castings. The display also included a wide variety of castings, with a background of foundry photographs.

Molding machines of practically every conceivable style were shown by all the prominent makers of that class of foundry equipment. In every instance the machines were connected with the air lines and available for demonstration. In many cases sand and operators were on hand to make molds and cores. Adams Co., Dubuque, Iowa, had several portable and stationary type jolt squeezers, with streamlined frames and equipped with safety valves to prevent injury to the operator. Two machines each had a riddle rack at one side, movable in any direction, and a long bench on the other side for the reception of molds. The booth also had flasks, jackets, vibrators and sprue cutters on display. Arcade Mfg. Co. Freeport, Ill., had six machines, three portable jolt and squeeze, one stationary jolt and squeeze type, one jolt squeeze-rollover machine and one small jolt rollover machine. That company also showed a variety of pouring devices, slip and snap flasks, jackets and bands.

Beardsley & Piper Co., Chicago, had an exhibit of sandslinger, mullers, screening and aerating machine, sand handling, preparing, molding and shakeout equipment occupying space in 10 continuous booths next to

Photos courtesy Kaufmann & Fabry Co., Chicago

the east wall in the south wing of the building. The muller at one end of the line and the large type sandslinger at the other were kept in constant operation. The muller unit presented several different features in design over former models, including mechanism to automatically control all operations. The sandslinger unit was provided with a double seat and a control stick similar to that of an airplane and convention visitors were given rides.

Champion Foundry & Machine Co., Chicago, in addition to three post type jolt squeezer machines, one small rollover and a model of a wet dust collector in the booth, had an extensive battery of jolt and squeeze machines operating in several adjoining booths where

the Junior Foundrymen of America, affiliated with the Chicago Chapter of the A. F. A., and the Chicago Public schools staged a continuous demonstration of mold and core making. Wm. Demmler & Bros., Kewanee, Ill., showed five sizes and types of core blowing machines, including one model in which all the movements are automatic, except for the removal of the corebox.

Herman Pneumatic Machine Co., Pittsburgh, had several machines on display to illustrate general features of machines of all types and sizes made by the company. Special features of interest include air operated clamps, runout tables and pattern drawing equipment. In addition to a wide range of molding machines, the International Molding Machine Co., Chicago, showed several types of core blowing machines. In a new type, four blowing units revolve around a central axis. Movement is indexed to secure four stages in the production of each core. With three operators it is claimed that a production of 1200 cores per hour is possible. Another single type machine equipped with a pattern or corebox drawing equipment is credited with a capacity to blow cores up to 250 pounds in weight.

Wide Variety of Machines Displayed

Johnston & Jennings Co., Cleveland, had molding machines, steel flask equipment, vibrators and hard iron stars on display. Machines included a jolt squeeze, a portable rollover, pattern draw and an improved type of jolt squeeze, rollover, pattern draw machine. Milwaukee Foundry Equipment Co., Milwaukee, exhibited several new types of molding machines. The company also had large photographs, printed literature and oral description of the equipment and methods for producing cast iron borings and crushed steel turning briquets. Wm. H. Nicholls Co., Richmond Hill, Long Island, N. Y., showed a standard type jolt squeeze machine, also a later improved model, two post type jolt squeeze machines with 10 and 11-inch cylinders, and a large jolt strip machine. An extensive display of photographs showed many prominent installations.

Osborn Mfg. Co., Cleveland, had 11 machines of various types on display. Several were improved models, while two were described as new jolt squeeze strippers with oil draw, automatic acceleration and machines in which the mold is jolted while in progress

upward against the squeezing head. It is claimed this is an important forward step and particularly efficacious under certain conditions. Seven machines exhibited by SPO, Cleveland, showed improvement in general appearance over those shown at former exhibitions. Bodies are modified and streamlined and minor changes have been incorporated in the design of many of the operating parts to secure greater accuracy, longer life or both. This company also had on display pattern equipment vibrators and accessories. Tabor Mfg. Co., Philadelphia, had on display 8 types of molding machines and three models of an abrasive disk type cutoff machine, also a dust collector for use with the cutoff machines, or for other application.

Showed Sand Mixing Machinery

C. O. Bartlett & Snow Co., Cleveland, showed equipment for castings handling and cooling, dust control and collection, sand drying and cooling, core ovens and skip hoists. A revolving glass case in the center of the booth showed large photographic views of foundry installations. A beautiful little model car type conveyor was shown in operation. A set of cast iron idler rolls illustrated a new form of construction to eliminate collection of dust or dirt. Blystone Corp., Cambridge Springs, Pa. exhibited a shovel type sand mixer, with direct connected motor drive and revolving screen over the mixer trough. Baker-Perkins Inc., Saginaw, Mich., had its booth arranged as a rest room for visitors.

Clearfield Machine Co., Clearfield, Pa., showed two types of revolving pan and roller sand mixers. Each mixer is equipped with a single roller and with a deflection disk designed to throw the sand in the path of the roller, or to throw the finished sand over the side of the pan into a container. In the new model the driving motor is mounted on a streamlined arm which extends from the foundation casting, over one side and into the center of the pan. Great Western Mfg. Co., Leavenworth, Kans., showed its complete line of gyratory type power driven riddles for sifting, mixing, aerating and fluffing sand heaps, mixing facing and core sand. This booth also had on display a laboratory testing sieve shaking machine used in sand control operation.

Stationary and portable type sand aerators were shown by Jeffrey Mfg. Co., Columbus, O., also a shakeout feeder for delivery of sand from the shakeout grating to a belt or to a container. An electrical device imparts a constant tremor to the inclined chute and keeps the sand in motion. A glass model illustrated the action of another device for feeding a constant supply of any powdered material for laboratory or shop use. Lancaster Iron Works Lancaster, Pa., displayed a scientifically designed counter-current roller and pan type mixer for preparing molding and core sand mixtures.

Heavy Unit on Exhibition

National Engineering Co., Chicago, had on display three mixing units including what is claimed to be the heaviest piece of equipment (*Please turn to page* 106)

ELIMINATE VARIABLES IN Core

RECOGNIZING that a number of variables are encountered in testing core oils, the authors have made an attempt to eliminate a number of these with a two-fold view in mind. First, they wished to attempt to set up, if possible, a standard for testing core oils for use in foundries; and, second, they wished to make it possible for all core oil manufacturers to submit core oils on a competitive basis which would do the work expected and demanded of them in the foundry.

To discuss this intelligently a concrete example should be cited and the variables examined and discussed as they are encountered during a test of a core binder.

Use Uniform Grade of Sand

The first step in conducting a test on dry sand cores is the selection of the silica sand. This should be as nearly as possible of one grain size and can be prepared by screening the sand to a predetermined screen size. By following that procedure a bothersome variable easily can be eliminated.

Next, a suitable mixture to be tested must be chosen. This should be relatively simple as most foundrymen are agreed that silica sand, core oil, and water should be used in the mixture to be tested. Such ratios as 100 parts of silica sand to 1 part of core oil, by volume, often are used. To these are added water. Most foundrymen choose a moisture content in agreement with their own plant practice. Usually about 4 per cent by weight is used, but it can be any percentage decided upon.

A suitable mixture which produces 200 pounds per square inch tensile strength in dry sand cores is as follows: 1600 grams silica sand, 50 mesh; 10 grams core oil; 2 grams cereal binder, and 64 grams water.

After the silica sand and mixture have been selected, the question of mixing the materials arises. This can be done by hand in any suitable container. The core oil should be added to the silica sand and both mixed uniformly. After that operation the water is added, and the sand, oil, and water mixed in a uniform manner.

When the mixture is mixed properly, the test cores are now ready to be made. That is done by placing a suitable amount of core sand into the hopper of the standard A.F.A. test core box. The core box should be clean and placed on a small core plate slightly larger in area than the core box. The question of how many times the standard A.F.A. rammer should be dropped on the core is an important one, and it has been found to be any number above 10 times. That number is specified because it is felt that any number lower than 10 rams does not develop the maximum strength of the core sand mixture. It is admitted that certain kinds of core sand mixtures might take more than 10 rams, but, in general, the maximum number of rams should never be below 10.

After the cores are rammed, they are removed from the core box, without rapping, in order to eliminate internal stresses or strains in the cores.

The next step in the process of testing dry sand cores is the selection of a suitable baking oven and baking temperature. It is of utmost importance to have an oven which provides adequate circulation and a supply of fresh air. Also, it is very important to have the oven designed so that no temperature gradients exist within the oven. Thermometers placed through the top will show this. There should be at least two thermometers or, if possible, four placed so that they can be read easily.

Control Temperature in Oven

If the oven is electrically heated, some kind of controller arrangement should be employed to keep close to the predetermined temperature of baking. A variance of plus or minus 5 degrees Fahr. is permissible and is about as close as can be expected. In addition to the thermometer, controllers, etc., a revolving shelf should be located within the oven which revolves completely at least every 45 to 60 seconds. In most cases this assures equal baking of the cores. Selection of the oven temperature should be in accordance with plant practice, but the temperature is usually about 400 degrees Fahr.

In selecting the length of time the cores should be baked, it is good practice to use various lengths of time as this shows the operator what the core binder will do under adverse oven conditions in the core room. It also shows the time at which the binding material reaches its maximum tensile strength.

After the cores are baked, they are removed and placed on a table or bench for 5 minutes. Core plates then are rapped slightly, the cores removed from the core plates, and placed in a desiccator which contains calcium chloride and phosphorus pentoxide as dehydrating agents. The cores are allowed to cool to room temperature in the desiccator to eliminate the factor of water absorption of the cores and resultant loss in strength.

It is very important to observe such procedure as water absorption has been found by repeated tests to

be one of the most bothersome errors to eliminate from the tests. It also has been found best to remove the cores from the core plate after 5 minutes because of the difference in contraction between the metal plates and cores. The different contractions cause stresses within the cores and tend to give low test results.

At this point the cores are just about ready to be tested for strength except for the important consideration of temperature of the test cores. It has been found that more uniform results can be secured if cores are tested at a standard temperature. A temperature of 100 degrees Fahr. has been found to be satisfactory both for summer and winter.

Cores Tested One at a Time

Therefore, some of the test cores are placed in a preheated oven at 100 degrees Fahr. for 1 hour, removed from the oven, one at a time, and tested one at a time. It may be argued that this procedure does not conform to the actual conditions of foundry practice. That may be answered by stating that, at this point, the concern is determining the actual strength of the core binder. If it is desired to determine the loss of strength of cores after they have absorbed water, that can, and should be, determined separately.

Other cores are heated at 250 degrees Fahr. for 1 hour and also tested for strength. It has been found that if a core possesses a strength of 200 pounds at 100 degrees Fahr., the strength will be reduced to about 100 to 115 pounds at 250 degrees Fahr. The

HAROLD S. AUSTIN
Foundry Metallurgist
Buick Motor Co., Flint, Mich.

and

C. E. SCHUBERT
Assistant Professor of Mechanical Engineering
University of Illinois, Urbana, Ill.

250 degrees Fahr. test gives an idea of how much strength the cores have at that temperature. Information about the strength of cores when hot is very useful to the core room. Oftentimes, coremakers desire to know the hot strength of cores because of certain operations performed on the cores at high temperatures.

Sometimes cores are dipped in a graphite solution and then reheated again. As the cores come off of the oven conveyors they are still hot and have to be handled in that condition. Usually, a grinding operation follows that step, and if the cores do not possess enough strength, large losses of cores result from breakage. Certain foundries often have to handle cores at temperatures as high as 300 degrees Fahr. In that case, it is suggested that the tensile strength of the cores at that temperature should be determined.

To determine the loss of strength of cores when subjected to moisture, it (*Please turn to page* 122)

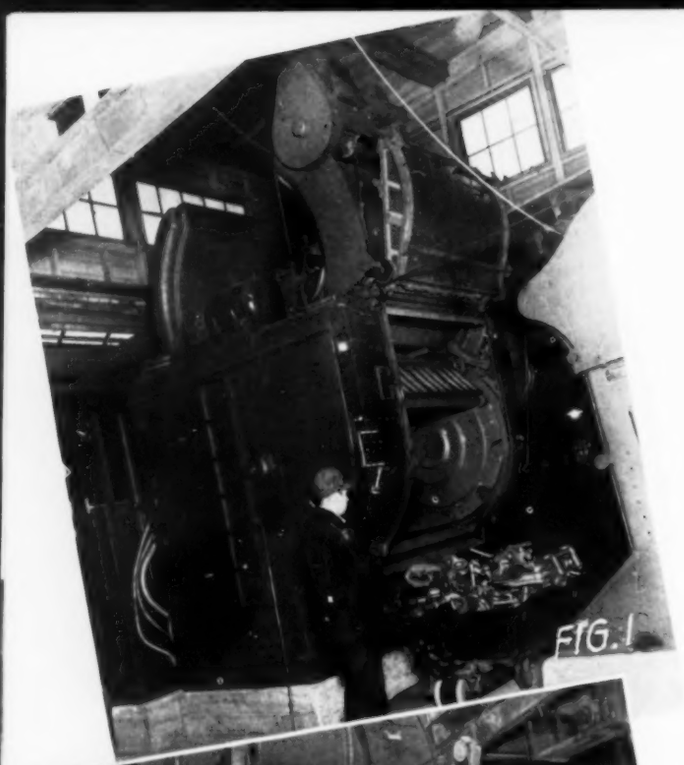


FIG. 1

FIG. 2

PRODUCES

By D. F. SEYFERTH
Works Manager
West Michigan Steel Foundry Co.
Muskegon, Mich.

SPECIALIZING in small casting production work, the West Michigan Steel Foundry Co., Muskegon, Mich., has been producing steel castings for the past 30 years. Normal monthly tonnage from metal melted in electric furnaces is 500 tons. A subsidiary company, the Austin Trailer Co., operates a fully equipped machine shop and manufactures truck and trailer parts, fifth wheels, landing gears, pintle hooks, etc. The foundry makes castings for road machinery, tractors, farm implements, mining equip-

Fig. 1—Load discharged from blasting barrel. Fig. 2—Class of work processed through barrel. Fig. 3—Taking sample carbometer test for rapid carbon determination. Fig. 4—Finish inspection department. Fig. 5—General view of squeeze machine floor. Fig. 6—Mechanized system of abrasive blasting large castings by tramrail

FIG. 3

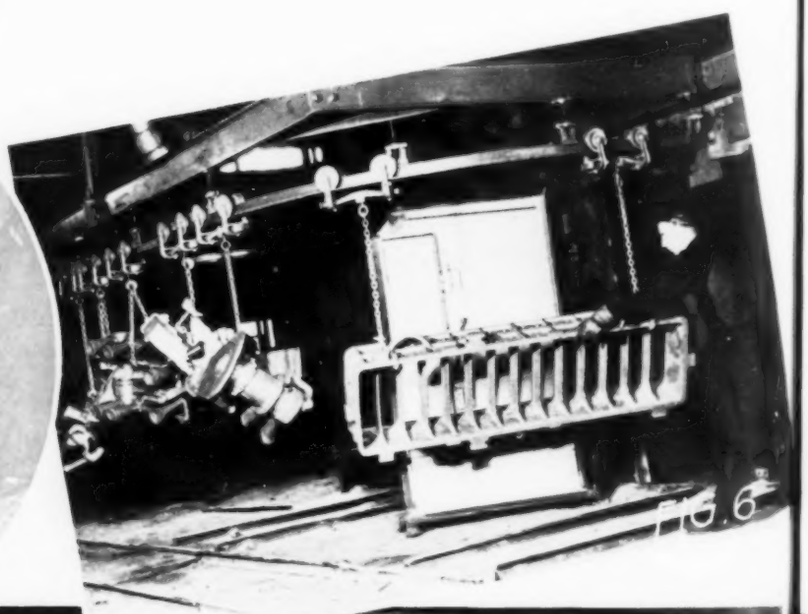


FIG. 6

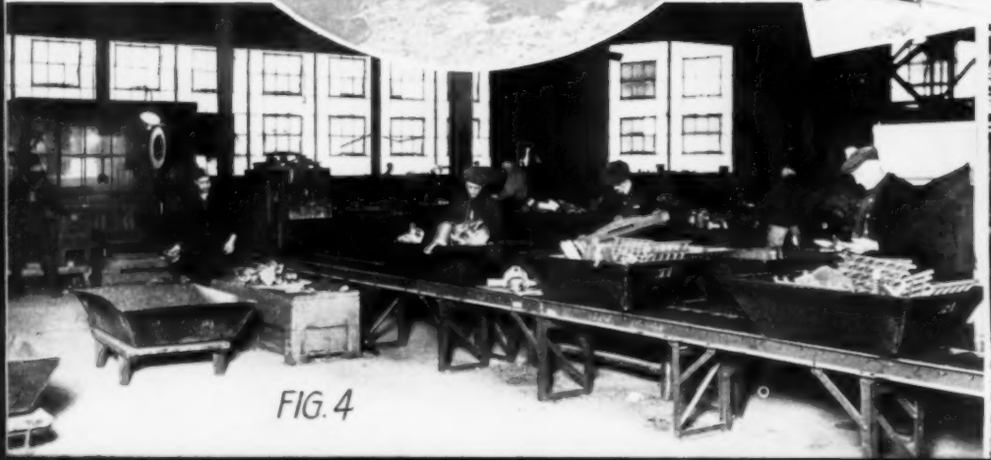


FIG. 4

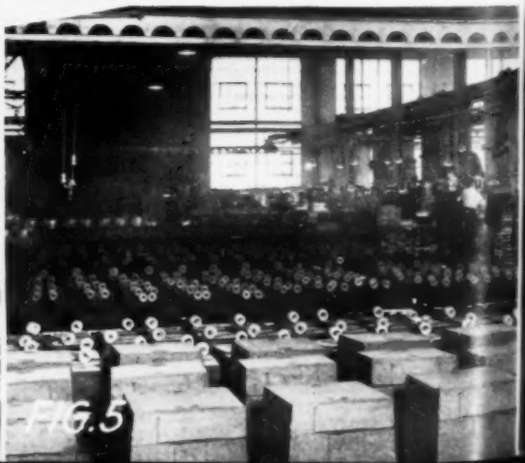


FIG. 5

VARIETY OF Steel Castings

FIG. 8

ment, railroads, machine tools, automobiles, trucks and trailers. Under normal conditions the firm provides employment for 550 men.

The company was among the first to adopt cleaning methods in which the castings, while in motion, are subjected to a stream of metal abrasive thrown with great force from a rapidly revolving wheel. It is claimed this method re- (*Please turn to page* 129)

Fig. 7—Second airless barrel in system where majority of annealed castings are cleaned. Fig. 8—System of pouring on squeeze machine floor. Fig. 9—Chemical laboratory. Fig. 10—Carbometer machine with operator checking carbon specimen obtained from bath. Fig. 11—Corner of sand control laboratory. Fig. 12—Section of cleaning room

FIG. 9

FIG. 7

FIG. 10

FIG. 11

FIG. 12

PRODUCING CASTINGS

Nickel

NICKEL silver castings can be produced readily in the foundry, providing one or two facts of a fundamental nature are understood fully. All nonferrous alloys containing appreciable quantities of nickel are susceptible to gas absorption during melting, particularly hydrogen, and accordingly, precautions must be taken during founding to minimize that action by rapid melting in a slightly oxidizing atmosphere. Importance of this cannot be overemphasized. If it is ignored, castings with varying degrees of porosity will result.

It will be appreciated that hydrogen capable of combining with the nickel-copper base metal usually cannot exist in the presence of free oxygen. However, in the reducing atmosphere, common to many natural draught coke-fired furnaces, its presence is a serious factor and will have a grave effect on the quality of the castings unless suitable modifications in melting technique are made. Having adopted the correct melting conditions it is still essential to give proper consideration to problems of composition, deoxidation treatment, pouring temperature and molding methods if satisfactory castings are to be produced.

Term Covers Wide Range

Variety of casting alloys used in the industry covers a wide field. The name *nickel silver* is applied normally to metals containing between 10 and 30 per cent nickel, 5 and 45 per cent zinc, remainder copper. Those alloys have been used widely in the past for fabricated sections, such as bars, tubes, sheets, strip, wire, etc., as required for the manufacture of cutlery, tableware, spun ornaments, springs and other articles.

Within recent years a demand also has arisen for the production of the alloy in cast forms, as exemplified by cocks and taps, bathroom and toilet fittings, valves, ornamental castings, die castings and fittings for railway carriages, ships, automobiles, refrigerators and other plant for the food industries. Compositions normally used for fabricated work are unsatisfactory for foundry purposes, particularly when producing castings to withstand pressure such as taps and cocks. Effect of individual elements so far as casting production is concerned is outlined in the following description of foundry technique and operation.

Nickel is of course the most important constituent in the nickel silvers and is responsible for the high corrosion resistance and attractive color of the alloys. In general it is desirable to specify at least 20 per cent of nickel to ensure a satisfactory degree of tarnish-resistance and a good white color. Lower amounts of nickel can be used, but such alloys will have a yellowish tint and corresponding lower order of corrosion-resistance.

Presence of over 20 per cent zinc appears to cause shrinkage troubles, particularly so far as sand-cast pressure work is concerned, and consequently that limit should not be exceeded except for special applications, such as, die-casting and sand-castings where maximum strength and hardness values are desired. High zinc contents also are objectionable from the practical point of view, due to the increased tendency for the evolution of zinc oxide during pouring and the coincident effect of this upon the health of foundry workers.

Zinc Improves Mechanical Properties

On the other hand zinc improves the color of nickel silver, giving a bluish tinge which increases the whiteness of the alloys after polishing and also assists to some extent in conferring tarnish-resistance. Considering all factors a zinc content between 10 and 20 per cent should meet most foundry requirements, the lower limit being used for obtaining maximum solidity in pressure castings of awkward and uneven design. As far as the mechanical properties are concerned, increasing the zinc content tends to raise the yield point, maximum strength and hardness, and to decrease the ductility.

From experience a small addition of tin has been found desirable in the production of nickel silver castings, as it seems to ensure density, fine grain and increased fluidity. It also has a marked effect on the tensile properties, increasing maximum strength and hardness to a considerable degree. In that respect it is interesting to note that the effect of tin is greater than that of zinc.

In nickel silver alloys containing lead the presence of a small percentage of tin also materially assists

S O F ■ ■ ■ ■ ■

Silver

By D. M. CURRY

in preventing *lead sweat*. For general work it is feasible to allow up to 4 per cent tin, and around the maximum addition it is extremely probable that tin plays an important part in minimizing carbon absorption; this latter factor being on the whole undesirable in the alloys as will be observed later.

Frequently lead is present intentionally in cast nickel silvers where ease of machining rather than tensile strength is of primary importance. Whether or not lead helps in production of sound castings is a debatable point, but many commercial alloys carry up to 7 per cent of that element. If the limit is exceeded, lead sweat may occur, particularly in heavy sectioned work.

Some attention recently has been given to iron in connection with nickel silvers and up to 5 per cent sometimes is used. Apart from increasing tensile strength, it recently has been shown that iron brings out certain characteristics useful in the food handling industry. For instance, it prevents accumulation of scum or fog on the surface, although having a general tendency to decrease the tarnish-resistance.

However, for normal purposes, iron is regarded as an impurity to be kept as low as possible and preferably should not exceed 0.50 per cent. Sulphur, as in other nickel alloys, should be kept at a minimum, that is, not more than 0.035 per cent. Silicon and aluminum are detrimental to the production of pressure-tightness in castings and for normal applications those elements should be absent. For ornamental work aluminum additions up to 3 per cent sometimes are made; the alloy then becomes susceptible to heat-treatment.

Presence of 0.25 per cent manganese is a distinct advantage as it deoxidizes the metal and tends to eliminate unsoundness. Magnesium and phosphorus also are used often for deoxidation purposes but the amount added should be such as to be entirely consumed by the reaction or, at the most, leave only a trace in the final product. Excess magnesium leads to *dirty* metal, while excess phosphorus causes embrittlement.

Carbon also can be classed as an objectionable impurity since under certain circumstances a reaction may occur between carbon and oxides with the formation of gaseous products and consequent unsoundness. Carbon, like sulphur, should be kept at an absolute minimum.

Nickel-containing nonferrous alloys are capable of absorbing hydrogen, carbon and sulphur, and as these elements have a deleterious effect at one or other stage of foundry operations it is essential to prevent their absorption by the metal during melting. Success of this depends to a large extent on the type of furnace used and the best results are obtained easily with either forced draught coke or oil-fired units. Other melting units such as natural draught coke-fired furnaces can be employed if necessary, providing certain factors are taken into consideration as outlined in the following paragraphs.

Oil-fired crucible pit type furnaces are suitable for nickel silver for two (*Please turn to page* 123)

NONFERROUS METALS ABSORB GAS DURING MELTING

By N. K. B. PATCH

SO MANY questions recently have been received from readers, in regard to the better melting of brasses and bronzes, that it seems desirable to repeat the importance of avoiding the absorption of gases during the melting process. Upon fracturing the casting, thus exposing the typical discoloration of the fractured surface, too many people are inclined to blame lack of permeability or excess moisture in the sand, hard ramming, or the like, when in reality it is proven easily that discoloration arises from gassing of the metal. This gassing takes place during the melting. It cannot be emphasized too often, or too strongly, that metal does not have to be molten to absorb the gases that later are thrown out of solution during solidification.

Gased Metal Shows Discoloration

As they pass out of solution, the gases open microscopical passage ways, which allow oxygen to pass in after the metal has cooled and the gases have passed out because of overheated condition. Oxygen oxidizes the surfaces in these passage ways and provides the discoloration so typical of this trouble. Many fractures having this discoloration do not show discoloration clear to the surface of the casting. The metal just under the outer skin looks sound and clean. This is because it has solidified first and driven the gases to the interior of the casting which solidified later. Almost always when subjected to pressure tests, the metal develops leaks, particularly if the skin has been removed in the machining process. The leaks frequently are only slight, due, of course, to the very small size of the passage ways. In many instances, the leak is simply a slow sweating process. Nevertheless, if these castings were fractured, they would show a discoloration typical of gassed metal.

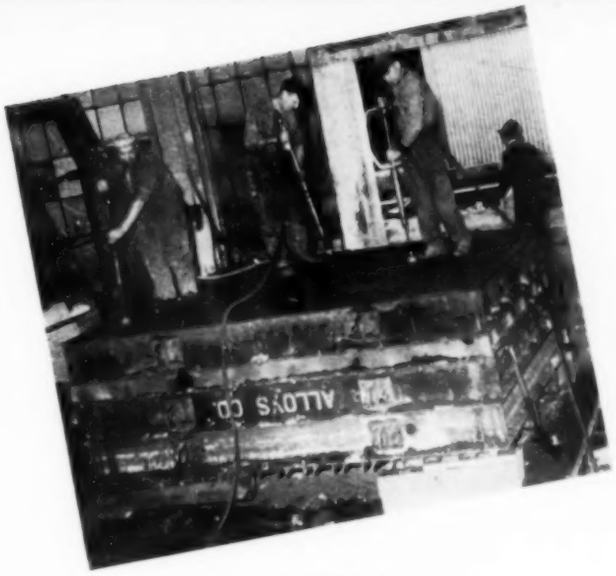
High copper or high aluminum alloys are easy to gas in the presence of underburnt fuels. Combustion of fuels should be as complete as possible. This demands an ample supply of oxygen to complete the combustion of the gases developed in the melting process. Where oil is the fuel, the first step is to gasify the jet and then burn it by combining with the necessary amount of oxygen. Insufficient amount of oxygen inevitably will result in some of the gases being only partially oxidized, which means that they are only partially burned. This results in the presence of underburnt gases. If they are in any large proportion of the total gas in the furnace, the metal promptly will absorb some, particularly if the melting process is slow.

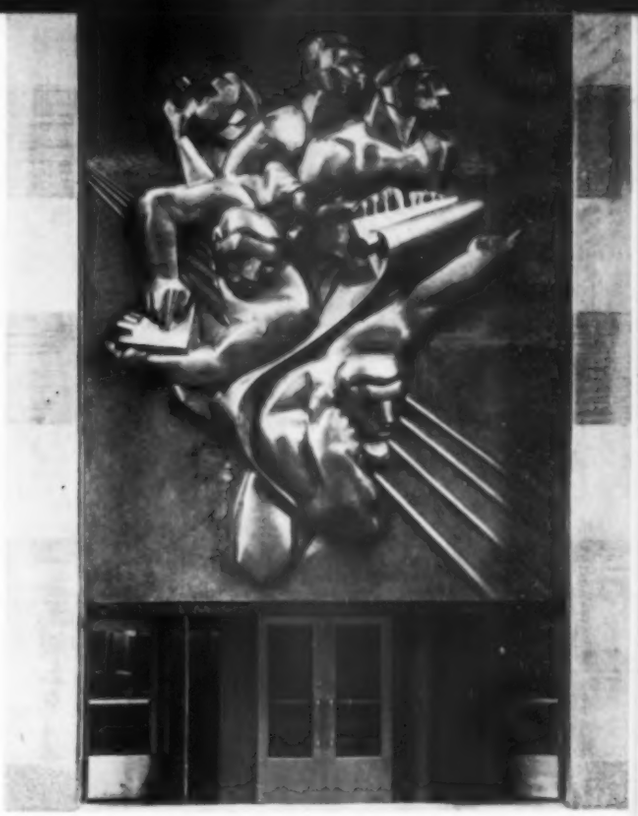
Furthermore, the metal does not have to be molten to absorb these gases. They begin to soak into the pores of the metal the moment these pores begin to expand through an increase in temperature. Where the gases are completely burned, any gas sucked into the pores is eliminated the moment the metal becomes molten. Where the gases are underburnt, the free hydrogen, a common gas found in improperly burned fuel oils and some of the commercial gases, immediately goes into solution the moment the metal reaches the molten stage, and, in consequence is present in the melted metal when poured into the mold.

Blow Holes Appear Near Riser

As the metal thereafter begins to solidify, it throws out of solution some of these gases. As it finally reaches the solid state, all the gases have been thrown out of solution. Some gas may be trapped in bubbles which appear later in the form of blow holes of varying sizes, usually in the part of the casting last to solidify. If the casting has been provided with proper risers, the blow holes will be near or in the riser.

Sometimes castings accepted as entirely satisfactory, and which frequently do give satisfactory service, in reality are imperfect. The metal contains microscopical interstices, or passage ways, through which the gases have passed to reach the risers. While the defects are not serious enough to condemn the castings, they reduce the mechanical and physical strength of the metal below its true value. Adequate risers provide a means for elim- (*Please turn to page* 128)





CASTS LARGE PLAQUE OF Stainless Steel

WHAT is claimed to be the largest metal bas-relief in the world recently was erected over the main entrance of the Associated Press building in Rockefeller Center, New York. Other claims include: First heroic sculpture cast in stainless steel; largest sculpture in Radio City; largest stainless steel casting; first sculpture in which the sections are joined by precision machining instead of welding. The 10-ton plaque was designed by Isamu Noguchi and the castings were made by the General Alloys Co., Boston, from (*Please turn to page* 116)

Fig. 1 (Top left)—Ramming 6 tons of synthetic sand into mold. Fig. 2 (Left above)—Pouring 5600 pounds of stainless steel into basins on largest mold. Fig. 3 (Left)—H. H. Harris, president, General Alloys Co., inspecting fittings of last section of the plaque. Fig. 4 (Left below)—Drawing pattern from smallest section. Fig. 5 (Right below)—Rolling over mold preparatory to drawing pattern. Fig. 6 (Right above)—The 10-ton stainless steel plaque

Bronze Pumps Must Withstand Action of Mine Water

We would like to know a suitable analysis for bronze pump castings which will be used in pumping mine waters containing sulphur.

Due to wide variations in mine waters it is difficult to predict success or failure of any of the several types of acid resisting bronzes available. A number of piston type pumps made of the 80 per cent copper, 10 per cent tin, and 10 per cent lead alloy have proved satisfactory in pumping some types of mine waters. However, with rotary pumps the rubbing of the impeller against the shell tends to remove any protective film that might be formed by chemical action of the mine water and bronze. Therefore, bronzes containing high percentages of lead that protect themselves by development of a chemical film cannot be expected to serve satisfactorily.

A good average acid resisting bronze containing 86 per cent copper, 11 per cent tin, 1½ per cent lead and 1½ per cent zinc has been fairly successful under some circumstances, although a lesser amount of lead or zinc might be better. That means more tin and higher cost. Aluminum bronze has been tried but there is little information published on its applicability. The best way to determine the most suitable alloy is to try several compositions under actual service conditions.

Increase of Strength Is Wanted In Flasks for Foundry Use

We want to make some aluminum alloy flasks, and are not certain as to what alloy to use to make them stronger. Will magnesium added to the ladle increase the strength? Also we are making cast iron flasks and would like to know if adding nickel shot to the ladle will increase the strength?

Magnesium is added to certain aluminum alloys to make them amenable to heat treatment which in turn usually results in a decided increase in strength. Those alloys are patented and information on suitable heat treatment and compositions will have to be secured from the producer. If you do not want to use heat treatable alloys, we believe that your flask can be made satisfactorily from either the 8 per cent copper-92 per cent aluminum alloy and its several variations, or from the 5 per cent silicon-95 per cent aluminum alloy. The latter alloy is more resistant to shock, a little easier to handle in the foundry, and somewhat harder to machine than the 8 per cent copper-92 per cent aluminum alloy.

Addition of nickel to cast iron without any other changes in composition probably will not result in any change in strength, but will increase machinability and reduce chilling tendency if such is present. However, by reducing silicon content on the basis that 1 per cent nickel is equal to 0.5 per cent silicon, the strength can be increased. We believe that you will find it more advantageous to add with the nickel, some other alloying element such as chromium, molybdenum, vanadium, etc. Suggestions are 2.00 per cent silicon with 1.30 per cent nickel and 0.50 per cent chromium; 2.20 per cent silicon with 0.30 per cent nickel and 0.30 per cent molybdenum; 1.75 per cent silicon with 0.85 per cent nickel and 0.10 per cent vanadium.

Designs Two Slag Holes Instead Of One for Small Cupola

We have built recently a cupola 21 inches diameter inside the lining with four tuyeres 3½ x 6¼ x 13 inches, wind belt 7 x 24 inches, blast pipe 8 inches diameter, sand bottom to charging door 10 feet, tuyere height above sand bed 15 inches. We have provided two slag holes, one 10 inches and the other 5 inches below the tuyeres. Do you think the bottom slag hole will give the same results as if the tuyeres were dropped 5 inches?

Where the cupola is operated properly the slag will flow as readily through a low slag hole as through a high slag hole. Usually the slag hole is placed in relation to the amount of iron required at each tap. Where the stream of iron is allowed to flow continuously, low tuyeres and a low slag hole are favored since they automatically reduce the height of the coke bed. Where a comparatively large amount of iron is required at a tap, the tuyeres and slag hole must be elevated. In the present instance with a low slag hole, the cupola will hold approximately 200 pounds of iron before it is tapped. With the high slag hole approximately 400 pounds of iron can be collected before it is tapped. The foregoing refers to the practice of leaving the slag hole open. Where the slag hole is opened only intermittently, the iron can be allowed to accumulate until it is almost up to the tuyeres.

However, this practice involves the closest care and attention since the iron may creep too high before the

slag hole is opened and as a result molten iron instead of slag will flow through the hole. Another factor to be considered is that the comparatively thin body of coke, in this instance only 5 inches between the sand bottom and the low slag hole, will have a tendency to cool the iron in the well unless it is allowed to run continuously. Under ordinary operating conditions our suggestion is to close the lower slag hole permanently and allow the slag to flow through the upper slag hole. This applies of course only to long heats. Where the heat does not extend over 1 or 1½ hours to melt from 1½ to 2 tons of iron, no slag hole is required. The small amount of slag developed will not interfere with the melting operation and will fall with the remainder of the cupola content when the bottom is dropped.

Making Low Carbon Steel for Case Hardening Is Difficult

In making low carbon cast steel for case hardening, can you give any suggestions on overcoming porosity? To get a steel of the proper grain size for a deep case, we cannot use any aluminum either in the furnace or in pouring. We have tried dry sand molds of high permeability, and green sand skin dried molds, both without the desired result. We also have tried raising the silicon range to 0.45 to 0.50 per cent and manganese to 0.80 to 0.90 per cent without results. When aluminum is used as a deoxidizer, even though only from 1½ to 2 pounds per ton, the porosity is overcome, but the aluminum inhibits grain growth. We use calcium silicon as a deoxidizer both in the furnace and in the ladle at tapping, but do not secure proper results. Have tried pouring with teapot, bottom pour with both 1-inch and 2-inch nozzles, and had porosity in each case. Castings are given a high normalize at 1950 degrees Fahr. after which pinholes are in evidence, not appearing before this treatment.

Making very low carbon steel for case hardening, in cast form, without the use of aluminum to prevent porosity, is rather a sticker. We have various suggestions, but they cannot be considered recommendations, as all of them so far are untried. First, in the steel making method, we have had more luck making this class of steel in the side blow converter than in the electric furnace.

If the electric furnace is used, under the existing circumstances it is obviously of the greatest importance to follow steel making practice such as outlined by Sims and Dahle in their recent papers presented before the A.F.A., in order to have the gas content as low as possible before the final additions are made. In other words, it would seem vitally important theoretically to melt down at a high, or comparatively high carbon content, ore down, and boil till action ceases, to eliminate gases. Study of the Sims and Dahle paper will illustrate that point.

If zirconium has not been tried as yet as a final addition, we suggest that you get in touch with the manufacturer and try that material according to recommendations. It may be that zirconium would turn the trick in this instance.

A final consideration is the molds. You state you have tried green sand, skin dried and dry sand, without improvement. It is possible that a Randupson mold, cement-bonded, which is very free from evolved gas troubles, might be of assistance, if the castings are of such shape and size as to lend themselves to this process. This can be told only by inspection of blueprints or patterns, of course.

The appearance of the pinholes after the normalizing treatment at 1950 degrees Fahr. of course, simply means that they are present just under the skin of the castings, and are brought to light when the immediate surface layer of the steel is oxidized away in the form of scale, leaving the ends of the pin-holes visible. We often have had that experience with austenitic manganese steel castings, which also are treated at 1950 degrees Fahr., with the formation usually of a heavy scale. Bad molds sometimes result in manganese steel castings with subsurface pin holes of this type, not visible till after heat treatment.

Limestone Should Be Placed on First Charge in Cupola

In our 25-inch diameter cupola the charges are made up of 275 pounds of iron and 125 pounds of steel scrap. We are pouring castings ⅝-inch thick and weighing 96 pounds. Should we use limestone on the first three or four charges. Does the limestone purify the iron, or is it used to purify accumulations that have formed in the cupola? At what stage of the heat should we apply the limestone or a proprietary soda ash product?

The only function of limestone in the cupola is to liquefy the slag. The primary purpose of the soda ash is to reduce the sulphur content of the iron, but it also serves as a liquefier of the slag. Wherever iron is melted with a solid fuel, coke in this instance, slag is produced. Several factors are responsible, but the bulk of the slag merely represents the ash or residue of the coke in molten form. Unless this slag is removed during the melting period it will solidify gradually and build out from the wall of the cupola to form a solid wall or bridge. Naturally this construction in the effective working area of the cupola restricts the melting speed and if continued long enough will prevent the blast from ascending, or the iron from descending. On the following day a great deal of time and labor are required to remove this accumulation before the lining can be daubed for the following heat.

Since the formation of slag is gradual, the proposal to use limestone depends on the duration of the heat. For short heats no limestone may be necessary. However, even on short heats the use of limestone is desirable since it keeps the slag in liquid form until the bottom is dropped and thus facilitates chipping out the lining on the following morning. On longer heats, from 1 hour to all day, limestone is essential to keep the cupola clear. The slag is removed through a slag hole, usually at the back of the cupola. It is optional whether the slag hole is left open all the time, or opened at periodic intervals when the slag in the cupola has risen up to a point nearly level with the tuyeres. If you are running heats for over an hour, use limestone on every charge, in this particular instance about 10 pounds per charge.

Coal Dust Produces A Smooth Face

We make miscellaneous gray iron castings and alloy iron castings up to a maximum weight of 1200 pounds and varying in thickness from ¼ to 1½ inches. Metal is poured at temperatures between 2725 and 2875 degrees Fahr. At present we use mixtures of Albany No. 1 and Lumberton molding sand. We want a very smooth surface finish on the castings and will appreciate your opinion on sand mixtures for facing and for the heaps.

For a general all purpose sand you can hardly improve on your present combination. However, if you are running individual heaps the Albany sand should be confined to the lighter castings and the Lumberton sand used on the heavier castings. According to standard specifications adopted by the A.F.A. the first sand would show: Moisture 6 to 7.5 per cent, permeability 25, green compression 6.2 to 7.5 pounds, deformation 0.019 to 0.022-inch, clay substance 12 to 14 per cent, fineness number 120 to 87, sintering 2400 degrees Fahr., green shear 1.4 pounds, dry shear 6.5 pounds.

The second sand would fall into the following classification: Moisture 4 to 6.5 per cent, permeability 80 to 120, green compression 5 to 7.5 pounds, dry compression 46 pounds, deformation 0.012 to 0.016-inch, clay substance 8 to 13 per cent, fineness number 61 to 50, sintering 2500 degrees Fahr. The first would be classified as *D* 4 while the second would be *D* 5. A typical facing mixture of either would contain 40 parts new sand, 60 parts old sand, 10 parts coal dust (less for the light floors) and 1 part cereal or pitch base core binder.

Bronze Should Meet Specific Condition

What is a good all-purpose bearing bronze for use on propelling wheels on dredges? Also what is meant by high compressive strength in bronze? Do you think that the 84 per cent copper 16 per cent tin alloy is suitable for making bearing shells which must take the load but not the wear?

Anything that is considered to be an all-purpose material, necessarily is a compromise with what is most desirable for a specific use. Many bearing manufacturers are using the 80-10-10 alloy for an all-purpose bearing composition, and others accept that as a basic formula and alter it by addition of say 2 per cent zinc, or of 0.25 per cent maximum phosphorus, and 0.5 per cent nickel. Bearing material must have enough tin present to form the hard delta and softer alpha structures. Presence of lead adds to the alpha matrix and in some cases is considered to be a semilubricant. However, it reduces the compressive strength (resistance to compression), and therefore, less lead may be desirable where a heavy load must be withstood. Nickel in the 80-10-10 alloy tends to refine the grain, causes some hardening, and increases compressive strength.

Measure of compressive strength of bronze is the load required to compress a standard specimen 1-inch high, 0.10-inch. High tin content usually indicates high compressive strength which is illustrated by the 84 per cent copper, 16 per cent tin alloy possessing a compressive strength of around 100,000 pounds while for the 80-10-10 alloy the compressive strength is 50,000 to 55,000 pounds. Use of the 84-16 alloy presumably refers to its application with a relatively thick white metal lining where it offers primarily a mechanical support. We believe that it would be better to use a brass or bronze less likely to crack when submitted to shock or blows, such as the 85-5-5-5 or 77-3-10-10 alloy.

Pattern Shows Film On the Surface

Our iron and aluminum patterns are mounted on cast iron plates and are equipped with electric heaters. Physical properties of the molding sand show: Moisture content 7.5 per cent, permeability 24, green compression strength 7.8 pounds per square inch; dry compression strength 35 to 45 pounds per square inch. Analysis shows 13 to 15 per cent pan material and 16 to 18 per cent clay content. We find a sandy film adhering to the surface of the patterns and plates. This material feels soapy when rubbed between the fingers.

Sand with excessive clay content shows a tendency either to stick to the pattern or to leave a thin film on the face. This tendency is intensified where the moisture content is higher than usual, also where the patterns are above or below normal temperature. Where the patterns are hot, the cold sand sticks and where the patterns are cold, the hot sand sticks. Your sand with a moisture content of 7.5 per cent may be ideal for molding purpose, but it may be a trifle too high for use under your special conditions. In your investigation we suggest you first consider this feature. Another possible source of the trouble is the character of the parting compound shaken over the patterns. All parting compounds give fairly satisfactory service, but under certain conditions one type may work satisfactorily where another may fail. Select several samples and try them experimentally.

Defective Areas in Ring Castings

We are forwarding a piece cut from a piston ring casting which contains a porous area. This trouble has developed only recently, and since there has been no change in our methods or materials, we are at a loss to account for the reason.

The defective spot in the sample is caused by a small amount of scum or froth which floated up part way in the mold and then became anchored either to the inside or outside wall while the remainder of the metal flowed past. The direct cause of the scum is a condition in the mold which forced a certain amount of gas or steam to enter the metal and set up a fluttery action. The sand may be too wet, too hard, not sufficiently vented with a wire, or with a natural permeability too low to permit the rapid escape of steam and gas.

By close check and through a process of elimination you readily can determine which or what combination of the foregoing factors is responsible. As a precautionary measure it is advisable to pour this type of casting in an open sand mold. Any slight unevenness over the top and lugs is not a factor of importance since this part of the casting is discarded after the remainder of the casting is machined. Metal is poured directly into the top of the ring. An attendant watches the metal rising in the mold and with a light steel rod dislodges any small pieces of scum or foreign material that show a tendency to halt in the upward journey.

Supply Lining for A Small Cupola

We melt about 4500 pounds of gray iron two or three times a week in a cupola lined to 24 inches diameter. We are now about to reline the cupola and will appreciate your opinion on the best type of material to use and whether to adopt a straight or a boshed form of construction.

Melting speed of a 24-inch diameter cupola is approximately 4500 pounds per hour. The wear and tear on the lining in that period is not an important factor. Casting two or three times a week, a 1-inch daubing of mud applied after every heat should keep the lining in satisfactory condition for a couple of years. At the end of that time you

(*Concluded on page* 54)

YOU'RE THE ONE WHO PAYS FOR POROUS CASTINGS!

—Photo courtesy Pratt & Whitney Division, Niles-Bement-Pond Co.

Hydraulic control valve body for precision machine tools. Design calls for 180 holes and fluid passages so this intricate casting was poured from a dense, machinable, pressure-tight Nickel cast iron. Your consultation is invited regarding production of castings from Nickel alloyed irons.

FOUNDRY FUNDAMENTALS:

To Protect Profits on Pressure Castings Use Nickel Cast Irons

Successful foundrymen depend on Nickel alloyed irons for pressure-tight castings because:

1 They are fine grained, dense and readily machinable in heavy and light sections.

2 Nickel goes into solution easily and evenly.

3 Nickel does not oxidize in the melting operation, therefore you get back in your castings the Nickel you put in your charge. In addition, the Nickel in your returns is fully recoverable.

4 Nickel is available in low melting point "F" Nickel in shot form for spout or ladle additions or ingot for cupola use.

THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET NEW YORK, N. Y.

(*Concluded from page* 52)

probably will find it necessary to replace only two rows of bricks in the melting zone. Conditions in a small cupola running short heats present practically none of the problems encountered in either small or large cupolas operating for several hours. In your case you can build a straight lining of fire brick, cupola blocks, refractory stone or a rammed, monolithic material supplied by advertisers in THE FOUNDRY.

Since you do not give the diameter of the shell we cannot suggest whether in the case of fire brick to use a single or double lining. Presumably you intend to maintain the same inside diameter. A single fire brick lining with the bricks standing on end and with the narrow face on the inside will serve fairly satisfactorily. However, if the shell diameter is large enough, a second row of bricks from the bottom up to a point approximately 1-foot above the melting zone provides a safety feature in the event that through some accident the lining burns through to a greater extent than usual. This second brick lining is laid with the flat face against the shell. In other words you will have a 7-inch lining in the operating part of the cupola instead of a 4-inch lining. Place the tuyeres so that the bricks above extend approximately an inch beyond the openings to prevent entrance of iron or slag.

Cores Stop Casting From Shrinking

We make three drill heads ranging in general dimensions from 22 to 27 inches in length, 14 to 17 inches wide and from 11 to 12 inches deep. The patterns are built according to shrink rule dimensions. We find that the castings shrink as expected in length and width, but the vertical dimension is the same as that of the pattern or in some instances is greater. The molds have been checked and are found true to pattern. The parting fin is light showing that the cope has not lifted. We shall appreciate your opinion on two points: Should the casting shrink vertically? If not, why not?

Theoretically a casting should shrink uniformly horizontally and vertically, and it will shrink uniformly where no hampering factors are in the way. Variations in casting thickness and the presence of cores are recognized as the principal factors which interfere with normal shrinkage. Thin sections cool first and solidify and thus prevent the slower cooling sections from shrinking to a normal extent. In certain instances expansion of the cores when heated prevents the casting from contracting normally. The metal stretches to a slight extent and of course remains in a state of tension. In many cases it is necessary to relieve that tension or strain through heat treatment at approximately 1000 degrees Fahr.

This phase of foundry practice is a matter of common knowledge to men engaged in the production of certain classes of castings and the patterns are made to various shrinkage dimensions to anticipate the condition. Possibly the cores may be a contributory factor in the castings but we are of the opinion that the explanation is much more simple. In a casting 11 or 12 inches deep the anticipated normal shrinkage is only one-tenth to one-eighth of an inch. In ordinary green sand molds, the pressure when the molds are filled with iron will increase the size of the mold to that extent. Hence, when shrinkage does take place the vertical dimension of the casting is the same as that of the pattern, or possibly in extreme instance, a little greater. The latter condition usually does not occur except in cases where the mold is not rammed hard enough or the pattern is rapped too hard.

If the casting was poured in an absolutely rigid mold, it would shrink equally vertically and horizontally. The ordinary green sand mold is not rigid. In fact if it is made too hard, the metal will not lie upon it quietly. A dry sand, loam, or special highly permeable green sand mold would resist the pressure and guarantee a casting of the shape shown to close dimension, but we assume that prices paid for the castings will not justify these special precautionary methods. Obviously, the only alternative is to accept current conditions, and provide no shrinkage allowance on the vertical dimension of the pattern.

Vent Between Teeth On Spur Wheel

Working students in a night foundry class are divided in opinion on whether the vents around the outside of a spur gear wheel should be opposite the center of the sand teeth or opposite the points of the teeth cavities. We shall appreciate your opinion on which method is correct and the reason for your decision.

The sand between the teeth practically is a core almost entirely surrounded by metal. It is vented for the same reason that any core is vented, to promote the steady escape of gas and steam generated in extra large volume by the surrounding metal. At the points of the teeth only a comparatively small quantity of metal comes in contact with the sand. Therefore, in that area the amount of steam is not excessive and readily may escape through the sand. Venting on the outside of the points is a waste of effort because it is not needed and because the vent passages are too far away from the sand teeth, almost entirely surrounded by metal, to be of any service.

Melting Speed of Cupola Too Low

What change in operation is necessary in a cupola lined to 48 inches where the wind goes on at 3:25 and off at 4:45 to melt a heat of 13,500 pounds. The charges are made up of steel scrap 500 pounds, pig iron 300 pounds and iron scrap 200 pounds. The bed charge of by-product coke is 1785 pounds with the first iron charge of 2000 pounds, all scrap. Subsequent charges are uniform, 210 pounds coke and 1000 pounds of mixed iron and steel. The cupola is provided with a practically continuous tuyere in eight sections, each 4½ x 14 inches, located about 12 inches above the sand bed. According to the volume gage a positive pressure blower delivers 3100 cubic feet of air per minute at a pressure of 6 to 8 ounces. The coke bed extends to about 50 inches above the tuyeres and the first iron does not appear until between 35 and 40 minutes after the wind goes on.

In a properly operated cupola the first iron should appear in from 7 to 10 minutes. Thereafter a 48-inch cupola should melt at the rate of 18,000 pounds per hour. This will require approximately 3700 cubic feet or its equivalent weight of air per minute at a pressure of 12 ounces. From the evidence submitted the bed is too high, the coke charges are too large and the volume or weight and pressure of air are too low. The height of the tuyeres above the sand bottom is satisfactory. Also the area of the tuyeres in comparison to the cross sectional area of the cupola, approximately 1: 3½ conforms to accepted principles. The usual height of the coke bed is 30 to 36 inches above the tuyeres. On account of the variation in weight between coke from different sources the bed is measured by height instead of weight. With a 50-50 charge of steel and iron a little more coke will be required than with an all iron charge. However in this particular instance 150 pounds of coke should be sufficient between the charges. Since many factors are involved, and since—as you state—hot iron is secured under present operating conditions, any changes designed to conform to more or less standard practice should be introduced gradually.

REQUIREMENTS MET AND MONEY SAVED

Cast iron distributor gears for automotive engines have several recognized advantages. They are quiet, wear well, and are comparatively inexpensive. The problem is to produce a cast iron with the necessary wearing qualities and yet keep it machineable.

Several automotive engine manufacturers are now obtaining the necessary strength (50,000 p.s.i.) and hardness (250-300 B.H.N.) — and eliminating machining difficulties—by making distributor gears of Nickel-Chromium-Molybdenum iron. The machineability of the iron is largely a result of its Molybdenum content.

By specifying this machineable iron, engine builders can meet distributor gear requirements with regard to noise and wearing quality — and save money doing it.

Full technical details concerning Nickel-Chromium-Molybdenum iron and other cast irons of interest to designers and makers of automotive engines are given in our book "Molybdenum in Cast Iron." Sent free on request to engineers and production executives.

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MOLY

MEN of INDUSTRY

LESTER N. SHANNON, elected president of the American Foundrymen's association at the annual convention in Chicago, is vice president and works manager, Stockham Pipe Fittings Co., Birmingham, Ala. Mr. Shannon is well acquainted with the work of the association, having served as vice president, director and a member of the executive committee. He was one of the organizers and first chairman of the Birmingham District Chapter of the A. F. A. and has taken an active part in the work of that chapter. Born in Carbon Hill, Ala., Mr. Shannon received his early education in the public schools there and later attended Birmingham Southern college from which he was graduated with a bachelor of science degree. Following graduation, he immediately became associated with the Stockham company in whose service he has risen to his present position. (See page 34.)

• • •

HERBERT S. SIMPSON, elected vice president of the American Foundrymen's association during its recent convention, is president, National Engineering Co., Chicago. Mr. Simpson has been connected with the foundry and foundry equipment industries for many years. He was born in Minneapolis in 1884 and moved to Chicago when a young boy. After finishing his education he engaged in the manufacture of clay works machinery, later becoming assistant to the president, Hatfield-Penfield Steel Co., Bucyrus, O. In 1917 he left that company to become associated with the National Engineering Co., Chicago, manufacturer of sand mixers and other foundry equipment. Mr. Simpson has been president of that organization since its incorporation. He is a past president of the Foundry Equipment Manufacturers' association, a past director of the American Foundrymen's association, and has for many years supported the various research activities of the A. F. A. Mr. Simpson has been active in politics in his home city, Evanston, Ill., and is a former alderman of that city. In recent years he has traveled widely making trips to Australia, South America, Mexico and frequent journeys to Europe, (See page 34).

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S. WELLS UTLEY, president, Detroit Steel Casting Co., Detroit, was the speaker at the City Club forum, Cleveland, recently.

• • •

GEN. THOMAS S. HAMMOND, president, Whiting Corp., Harvey, Ill., has been elected a director, American Airlines, Inc., Chicago.

• • •

CHARLES E. BRUST, formerly with the Eastern Malleable Iron Co., Naugatuck, Conn., has been made managing director of the Eberhard Mfg. division of the Eastern Malleable Iron Co., Cleveland, succeeding A. L. WHEELER.

• • •

J. H. REDHEAD, president, Lake City Malleable Co., Cleveland, recently resigned as vice president and general manager, Erie Malleable Iron Co., Erie, Pa., to devote all of his time to the former organization.

• • •

H. A. FELDBUSH has been elected vice president, Worthington Pump & Machinery Corp. and will make his headquarters at Holyoke, Mass., where he will be in charge of the company's works in that city in the manufacture of air and refrigerating equipment.

• • •

JOHN J. CROWE, formerly manager, apparatus research and development department, Air Reduction Co., New York, has been appointed assistant to Herman Van Fleet, vice president and operating manager. H. E. LANDIS JR., formerly assistant to Mr. Crowe has been appointed manager of the apparatus research and development department.

• • •

KENNETH H. HAMBLIN, formerly superintendent, Thomas Devlin Mfg. Co., Burlington, N. J., and more recently superintendent, Frazer & Jones, Inc., Syracuse, N. Y., has been made general superintendent, Detroit Brass & Malleable Works.

• • •

E. D. BRANSOME, president, Vanadium Corp. of America, New York, has been elected a director of General Refractories Co., Philadelphia. DR. RUSSELL P. HEUER, vice president and director of the Refractories company, has been elected a member of the executive committee.

• • •

W. B. COULLIE, formerly assistant to the president and general sales manager, Harbison-Walker Refractories Co., Pittsburgh, recently was elected vice president. H. S. ROBERTSON, formerly assistant general sales manager, has been appointed general sales manager.

• • •

ROBERT H. HEYER recently has been appointed to the staff of Battelle Memorial institute, Columbus, O. Mr. Heyer holds bachelor of science and master of science degrees from the University of Minnesota and was formerly a research metallurgist with the American Rolling Mill Co., and has been a member of the faculty at Purdue university. Mr. Heyer received the A.S.T.M. Dudley medal in 1938.

• • •

F. L. LAQUE, formerly assistant director of technical service on mill products in New York, International Nickel Co. Inc., New York, has been placed in charge of development activities on all applications of both ferrous and nonferrous

(*Concluded on page* 58)

"Most Satisfactory for Making Piston Rings"

says Leading Metallurgist of

WOODWARD IRON

FOUNDRYMEN all know that piston rings are probably the most sensitive of all castings with regard to machinability. Hence we were deeply gratified when informed last month by the chief metallurgist of one of the world's largest manufacturers of piston rings that:

"Woodward iron has proven to be the most satisfactory pig iron that has been received in our plant during the last two years. It suits me if we never order any other kind."

This plant is now using greatly increased shipments of Woodward Iron. If you, too, are making intricate castings where machinability is of major importance, give Woodward a trial order and you will soon become another ***regular*** Woodward customer.

WOODWARD IRON COMPANY

WOODWARD, ALA.

America's Largest Completely Integrated and Entirely Independent Merchant Iron Producer

INDEPENDENT SINCE 1883

(*Concluded from page* 56)

nickel-containing alloys. DR. WILLIAM A. MUDGE, formerly works metallurgist of the company's rolling mill at Huntington, W. Va., and who recently joined the technical service section of the development and research division in New York, has beeen appointed assistant director of technical service to succeed Mr. LaQue.

♦ ♦ ♦

ROBERT J. MADDISON, formerly superintendent, Sweets Foundry, Johnson City, N. Y., has become associated with Whitehead Brothers Co., New York. Mr. Maddison was born in Dover, N. J., and received his education in the public schools of that city and in the Newark College of Engineering, Newark, N. J., from which he was graduated in 1934 with a degree of bachelor of science in mechanical engineering. While still pursuing his education, he gained practical foundry experience during summer vacations in the Richardson & Boynton Co. Inc., Dover, N. J., plant from 1926 to 1933. In November, 1933, he became associated with Eastern Steel Castings Inc., now American Steel Foundry Co., Newark, N. J., and upon graduation in 1934 became a regular employe of the firm working in various departments. In 1935 he joined the Vulcan Wheels Inc. division, American Brake Shoe & Foundry Co., Newark, and in 1936 became associated with National Radiator Co., New Castle, Pa. From 1937 to 1939 Mr. Maddison was on the faculty of North Carolina State college of the University of North Carolina, Raleigh, N. C., in charge of foundry and forge shops. He then became superintendent, Sweets Foundry, Johnson City, N. Y., which position he left to assume his present connection.

♦ ♦ ♦

WALTER E. NAYLOR, for many years identified with the foundry industry as a foundry engineer, recently became connected with the Champion Foundry & Machine Co., Chicago. Mr. Naylor was associated for 10 years with the International Harvester Co., Chicago, and

Walter E. Naylor

then spent 16 years with the Beardsley & Piper Co., Chicago. In his new connection he will act in an engineering and sales capacity.

♦ ♦ ♦

D. WESLEY CASE, foundry superintendent, Belknap Mfg. Co., Bridgeport, Conn., has been made president, Connecticut Nonferrous Foundrymen's association. Mr. Case was graduated from the Pittsfield, Mass. high school and his first connection with industry was with the Pittsfield Spark Coil & Magneto Co., Pittsfield. For the past 23 years he has been foundry superintendent of the Belknap Mfg. Co., engaged in the production of high grade pressure castings. Mr. Case has been an officer in the Connecticut Nonferrous Foundrymen's association for the past 4 years and has been active with the organization since 1930. He has served as treasurer and vice president.

♦ ♦ ♦

JOHN JOSEPH SHEEHAN, author of the annual exchange paper of the Institute of British Foundrymen presented at the recent convention of the A.F.A., received his metallurgical training at the Royal College of Science, Ireland, and is an associate of that college. He also received a bachelor of science degree from the National university, Ireland. For some time he worked in America, mainly in the mining regions of the Rocky mountains, and with the Ford Motor Co., Detroit. He then became associated with the Ford Motor Co. Ltd. plants in Cork, Ireland, and Dagenham, England. At present he is foundry superintendent, Austin Motor Co., Birmingham, England. Mr. Sheehan is a pioneer of synthetic sand practice in England, and has written several papers on the subject, notably, "Recent Developments in British Synthetic Sand Practice" presented at the Manchester conference of the I.B.F. in 1934, and "Core Shop Control" presented at the International Foundry congress held in London in 1939.

♦ ♦ ♦

TOM BARLOW, recently was made foundry engineer with the Foundry division, Vanadium Corp. of America, Detroit. Mr. Barlow's experience following graduation from the University of Michigan included a number of years as chief metallurgist, Ecorse Foundry, Detroit, and 3 years as research metallurgist, Battelle Memorial institute, Columbus, O., where most of his time was devoted to original research on the effect of various alloys and late ladle additions on the properties and structure of cast iron. During the past year he has directed the research, development and service activities of the Copper, Iron and Steel Development association. Mr. Barlow's activities with R. G. MCELWEE, Foundry division manager, will be directed toward development of foundry control alloys and servicing the alloys now being produced by Vanadium Corp. for foundry use.

♦ ♦ ♦

THOMAS E. COCKER has been appointed manager of the Detroit district office, Chain Belt Co., Milwaukee. Mr. Cocker succeeds G. A. GUNTHER.

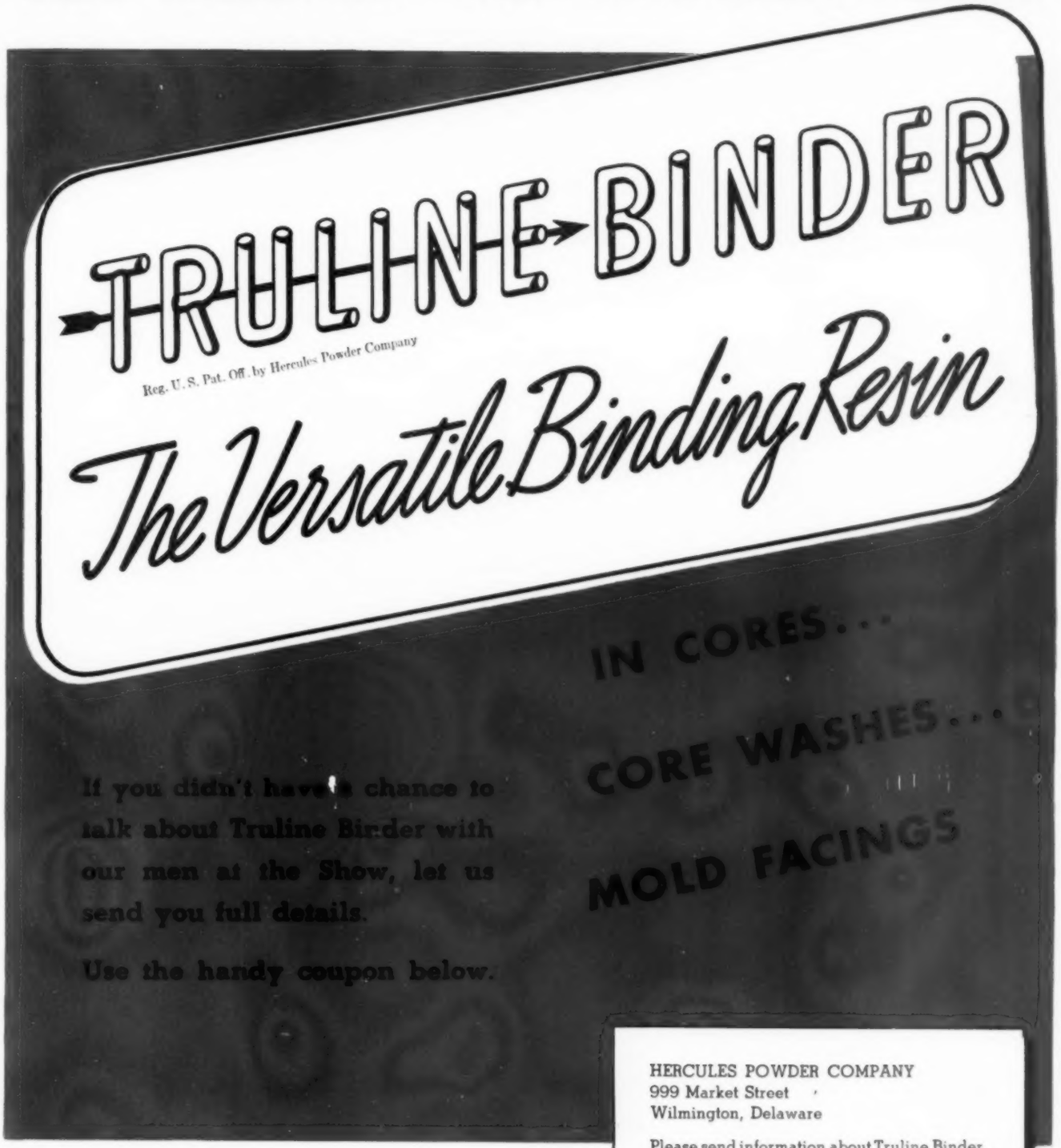
Robert J. Maddison

John J. Sheehan

D. Wesley Case

Tom Barlow

THE TALK OF THE FOUNDRY SHOW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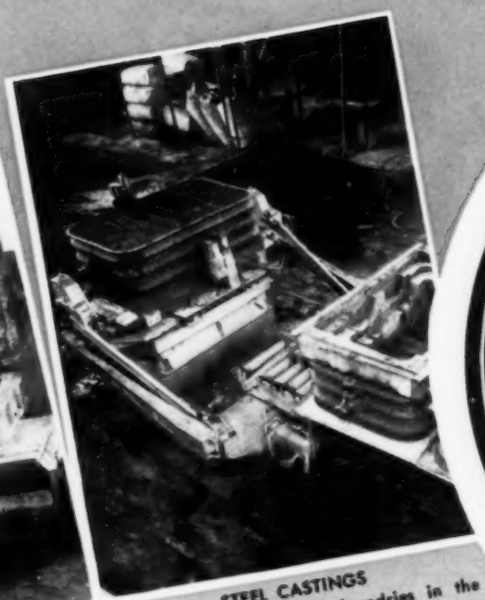
CAR WHEEL INSTALLATIONS

There are 16 Herman installations making chilled car wheels at the rate of one a minute or better. These are mechanized production foundries scattered throughout the United States and the Herman Molding Machines are important cogs in their operations. Hermans are reliable!

BOILER AND HEATER CASTINGS

Hermans are used in 22 or more foundries on all types and sizes of boiler and heater castings. One such foundry has at least fifty installations and has poured as much as 850 tons of metal in 24 hours. Hermans produce!



STEEL CASTINGS

Approximately 143 steel foundries in the United States and Canada have one or more installations of Herman Jarr Squeeze, Jarr Stripper, Plain Jarring, or Jarr Rollover and Pattern Drawing Machines. These Hermans are making records of various kinds; one installation of two machines has produced as many as 210 railroad side frames in nine hours; molds up to 70 tons are jarred on a Herman; average 8 hour production per man on molds weighing up to 1000 pounds is 50 on a pair of Hermans; etc. Hermans are universal!

WAS YOUR HERMAN

One of the greatest attractions at the recent 44th Annual Convention of the American Foundrymen's Association was the Herman exhibit of typical installations. The eighteen large photos included just about every size and type of foundry molding jobs.

We are proud of every Herman installation and we are only sorry that space did not permit the exhibition of hundreds of other Herman installations that are giving complete satisfaction in foundries throughout the world.

HERMAN

Your Foundry ?

ALUMINUM AND BRONZE CASTINGS

Hermans are making airplane cylinder castings, car and mill brasses, ornamental doors and grilles, etc.; castings that are difficult to draw, that must be perfect. Hermans are accurate!

MACHINERY CASTINGS

Machine tool, textile machinery, laundry machinery, in fact, machinery castings of all kinds are produced on Hermans at great savings over previous methods. Herman Jarr Rollovers make the complete mold!

YOUR FOUNDRY

The chances are nine out of ten there is a place in your foundry where Hermans will save you money. If, after a survey, our trained foundry engineers find there is not, they will be the first to admit it. Our sales policy has always been based on facts, not on theories, and the modern Hermans as now built are the result of over forty years' experience in the design and construction of molding machines. Hermans will save you money!

FOUNDRY IN THE *Hall of Fame?*

Why not consult a Herman engineer now? His portfolio is filled with both photos of interesting installations and facts concerning modern foundry practice. It would pay you to investigate.

HERMAN PNEUMATIC MACHINE CO.

UNION BANK BLDG., PITTSBURGH, PA.

MOLDING MACHINES

Cincinnati

SIXTY-TWO members of the Cincinnati District chapter of the A.F.A. attended the regular meeting held Tuesday evening, April 9. After dinner, Chairman Herman Ewig held a short business meeting and appointed the following nominating committee: E. T. Korten, chairman, Ray Redmond, Robert Ebersole, Charles Hilb and Larry Gosiger. Eight directors are to be nominated, four of which will be elected at the June meeting to serve for 3 years.

Twenty-five additional members were included in the group which witnessed feature of the evening, a presentation of colored movies of a recent trip to Alaska by W. F. Piper, Bearsdley & Piper Co., Chicago. This was followed by another film, "Foundries Around the World." All present thoroughly emjoyed the pictures.—*E. T. Korten, secretary.*

Reading

REGULAR monthly meeting of the Reading Foundrymen's association was held at the Wyomissing Club, Reading, Pa., on March 19. The meeting was called to order by President E. J. Snell, who introduced the speaker of the evening, W. W. Rose, executive vice president, Gray Iron Founders' society, Cleveland.

Mr. Rose's topic, "How to Sell Castings," proved to be very interesting and enlightening. He stated that the whole matter of sales requires thought and planning. No matter how fine the product and service, it cannot be disposed of profitably unless foundrymen forsake alibis and anticommercial practice. They are the resort of the lazy and inefficient, Mr. Rose stated. "No umbrella is broad enough or tough enough to cover the latter. Don't let the neighbors run your plant. When the purchasing agent tries to break down your prices by quoting what John Smith offers, have the strength to say 'No.' You will gain respect by so doing."

Mr. Rose also said that each manufacturer should know how to make his product, know its best applications and why. He should see to it that his salesmen know all about this too. Costs should be known. "Stick out for profit and join with your fellows to increase market knowledge, education and publicity. Co-operation of this kind pays dividends. Many foundries, large and small, are making money now and have been right along. You can join them if you will," was Mr. Rose's conclusion. Meeting was attended by 75 representatives of foundries in the territory.

A meeting was held at the Wyomissing club, Reading, Pa., on April 16 with President E. J. Snell presiding, and 75 members present. The entertainment committee announced plans for holding the association's third annual picnic and golf tournament at the Manor Country club, Fritztown, Pa., on June 29. The secretary reported progress on the wage survey now being made, and stated that reports would be sent out soon.

Speaker of the evening was J. W. Juppenplatz, metallurgist, Treadwell Engineering Co., Easton, Pa., who discussed the iron-carbon system and its effect on castings. He pointed out that while the equilibrium diagram did not include effect of manganese, sulphur, phosphorus, etc., it can be used as a base, and during the past few years use of the factor, carbon plus 0.3 silicon, for effective carbon improved its practical application. Mr. Juppenplatz described an iron-carbon alloy of eutectic composition as one which neither wants to absorb or reject carbon. Hypoeutectic alloys or those with less carbon than the eutectic tend to absorb carbon. He mentioned difficulty with rough surface on low-carbon iron castings poured into molds faced with graphite, which was remedied by a facing containing more siliceous material. Numerous other practical experiences were included in his talk to show relationship between the iron-carbon diagram and castings.—*H. C. Cummings, secretary.*

Southern California

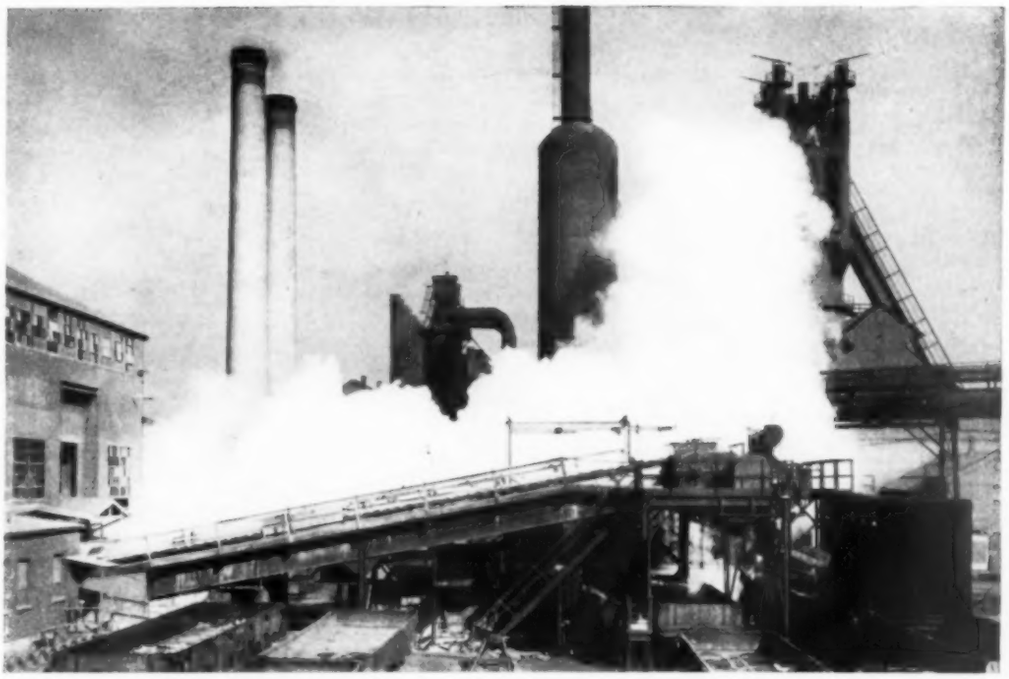
NINETY members attended the regular meeting of the Southern California chapter held April 25 at the Clark hotel, Los Angeles, with A. G. Zima, chairman of the chapter, presiding. Following the dinner R. E. Gregg, chairman of the nominating committee presented the names of the following for officers and directors to be elected at the May meeting: Chairman, James E. Eppley, Kinney Iron Works; vice chairman, Glenn Merrefield, Warman Steel Castings Co.; secretary, W. F. Haggman, Foundry Specialties Co., Huntington Park, and treasurer, Earl Anderson, Enterprise Foundry Co. Directors for 2 years: B. G. Emmett, Los Angeles Steel Casting Co.; James O'Hara, Fraters Valve & Fittings Co.; A. M. Barker, Barker Foundry Supply Co., and H. E. McGowen, H. E. McGowen Co.

Coffee talk was presented by Mr. Wasson, U. S. Secret service, Los Angeles, on counterfeiting, and was illustrated by an interesting motion picture, "Know Your Money." Principal speaker was R. E. Brown, Electro Metallurgical Co., who discussed the evaluation of deoxidizing and graphitizing alloys in gray iron production. He pointed out that although a comprehensive understanding is available on base mixtures, cupola operations, and proper employment of various alloy additions, considerable difficulties in the founding of iron have existed until recently, and the most complex of those is that concerning wall sensitivity.

Mr. Brown stated that now it was

(*Continued on page* 64)

YOUR Foundry Problems Are OUR Problems Too



Few things please us more than inquiries from customers who have special foundry problems to solve. These inquiries, particularly those involving pig iron, are our cue to put the skill and experience of practical foundrymen and trained metallurgists to the test. Then the policy underlying the production of Wisconsin Pig Iron—"Better Controlled from Mine to Mold"—works hand in hand with the customer. A competent staff of technical men is in charge—checking and rechecking—every inch of the way. The result is *pig iron that satisfies*, that is uniform and true, through and through.

Wisconsin Pig Iron is being used successfully by manufacturers of quality castings in every line of business. Truly, *your* foundry problems are *our* problems, too.

Ask us to explain more fully how you can benefit from this policy of closely supervised product control. Inquiries will receive prompt attention.

WISCONSIN STEEL COMPANY

General Offices:

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WISCONSIN PIG IRON

"BETTER CONTROLLED FROM MINE TO MOLD"

ADVERTISING PAGES REMOVED

(*Continued from page* 62)

feasible to deal successfully with that problem, and that castings containing both heavy and light sections could be produced with both sound, strong sections and readily machinable light sections. Procedure involves use of ladle deoxidation and graphitization employing scientifically balanced alloys of silicon with other elements. Process involves reduction of silicon in base mixture from 0.50 to 1.0 per cent and over with relatively large addition of that element in the ladle as a silicon deoxidizing and graphitizing alloy. Mr. Brown identified a number of silicon alloy combinations available and suitable for use in that practice. Through explanation of the metallurgy involved, he evaluated the comparative efficiency of the compositions in most general use.—*W. F. Haggman, secretary.*

Chicago

LAST 1939-1940 meeting of Chicago chapter of the A.F.A. was held May 13 in the Celtic room of Chicago Towers club, and featured induction of new officers, a showing of films taken at the 1939 stag outing and golf party, and an address by L. P. Robinson, director of core oil sales, Werner G. Smith Co., Cleveland.

As retiring chairman, C. E. Westover, Burnside Steel Foundry Co. Chicago, was lauded by chapter leaders for his excellent work in guiding the chapter through the past year, and particularly for his efforts in connection with the foundry exhibit at the Museum of Science and Industry, and his work in shaping the recent national convention in Chicago. L. H. Rudesill, Griffin Wheel Co., Chicago, and a past chairman of the chapter, made the presentation to Mr. Westover of a statuette of a foundryman, a traditional award of the chapter to retiring chairmen.

Accomplishments of the past year were reviewed briefly, following which new officers were inducted. These include Garnett P. Phillips, International Harvester Co., Chicago, chairman; L. L. Henkel, Interlake Iron Corp., Chicago, vice-chairman; Bruce Simpson, National Engineering Co., Chicago, secretary; C. C. Kawin, Charles C. Kawin Co., Chicago, treasurer; and directors for three year terms, C. E. Westover, Burnside Steel Foundry Co., Chicago; H. A. Forsberg, Continental Roll & Steel Foundry Co., East Chicago, Ind.; T. J. Magnuson, Champion Foundry & Machine Co., Chicago; and M. Lefler, Western Foundry Co., Chicago. Unfortunately, Mr. Phillips was unable to be present, and his chair was taken temporarily by the new vice-chairman L. L. Henkel.

Members took particular delight in the showing of the films taken at the last stag outing and golf party at Lincolnshire country club last September, especially where the pictures revealed difficulties of the golfers blasting their way out of sand traps and woods. The film also showed the crowds and many foundry personalities at the registration desks, ball game, horseshoe tournament, refreshment stands, and in conclusion at the banquet and floor show.

L. P. Robinson, erstwhile J. P. Morgan of eggdom, initiated foundrymen at the meeting into the economics and technicalities of running a first-class chicken farm into red ink. The announced topic, "How to Lose Money on a Modern Chicken Farm," traced Mr. Robinson's fowl business from a humble beginning to a point where the audience agreed with him that it was the closest approach to perpetual motion yet attained in the annals of mankind. With interesting sidelights on barnyard husbandry, the speaker showed how, by ingenious purchasing of modern equipment and numerous economic sleight-of-hand feats, he skippered his business to such heights as invasion of the Boston brown egg market, and on to even greater triumphs, until finally the economic structure of the chicken ranch was so involved that eggs were reduced to the status of a mere by-product. In 8 years of pleasant associations with his feathered employes, the correction of the difficulties with "Hen No. 245" was only one of the many obstacles which Mr. Robinson took in his stride.—*J. F. Powell.*

Central Indiana

CENTRAL Indiana chapter of the A.F.A. met at the Hotel Washington, April 6. Principal dicussion was presented by Russell J. Greenly, chairman, trade and industrial education, Purdue university, Lafayette, Ind, on "Training for Industry." Mr. Greenly discussed apprenticeship education, and the place and problems of supervisory forces in industry. An interesting discussion followed the presentation.

The Central Indiana chapter has been organized only a few months, and the membership has grown to 107. To help establish the chapter on a firm footing, it was decided by the members to re-elect all directors and officers for the coming year. These include the following: Chairman, I. R. Wagner, Electric Steel Castings Co., Indianapolis; vice chairman, B. E. Gavin, National Malleable & Steel Castings Co., Indianapolis; treasurer, J. P. Lentz, International Harvester Co., Indianapolis; secretary, R. A. Thompson, Electric Steel Castings Co., Indianapolis; directors, L. E. Davis, Republic Coal & Coke Co., Terre Haute, Ind.; M. B. Falvey, Hoosier Iron Works, Kokomo, Ind.; H. B. Harvey, Indiana Foundry Corp., Muncie, Ind.; C. M. Hardy, Hougland & Hardy Inc., Evansville, Ind.; R. L. McIlvaine, Swayne-Robinson Co., Richmond, Ind. B. P. Mulcahy, Citizens Gas Coke Utility, Indianapolis; L. C. McAnly, Rockwood Mfg. Co., Indianapolis; Stanley A. Norrick, Perfect Circle Co., New Castle, Ind.; E. G. Schmidt Jr., International Harvester Co., Indianapolis; S. C. Wasson, National Malleable & Steel Castings Co., Indianapolis.—*R. A. Thompson, secretary.*

Quad City

APRIL meeting of the Quad-City Chapter of the A. F. A. was held at the LeClaire hotel, Moline, Ill., Monday, April 15. There were 75 present for dinner and 125 for the technical session. Herman Alex, Rock Island Arsenal, Rock Island, Ill., and chairman of the chapter, presided.

Nomination for officers for the organization for 1940-41 were made as follows: Chairman, Nathan Lesser, Deere & Co., Moline, Ill.; vice chairman, A. H. Putnam, A. H. Putnam Co., Rock Island, Ill.; secretary-treasurer, J. Morgan Johnson, Moline, Ill. Board of directors, Hyman Bornstein, Deere & Co., Frank W. Wells, J. I. Case Co., F. O. Gorman, John Deere Spreader Works, for 1 year; P. T. Bancroft, E. C. Wussow, Williams-White & Co., J. H. Ploehn, French & Hecht, Inc., for 2 years; A. E. Hageboeck, Frank Foundries Corp., L. E. Roby Jr., Peoria Malleable Castings Co., Ray Wendland, International Harvester Co., for 3 years; as well as Herman Alex, trustee for 3 years.

Hyman Bornstein presented the main speaker for the evening, C. E. Westover, superintendent, Burnside Steel Foundry Co., Chicago, who spoke on "Job Evaluation and Time Study." Mr. Westover discussed his foundry experiences relating to a shop where each molder had his own ideas as to methods and equipment used for making molds, with no definite system followed by the workers. In comparison he showed the classification of jobs and also of workers to mold those classes, and the evaluation study to determine classifications designated as A, B and C. Classes of workers and jobs are determined on the ability of the man and the skill necessary on the jobs, with all factors on any particular job being considered. Slides were shown

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on how various jobs in the core room of the foundry had been evaluated to determine price to pay for the work, after a study of some 34,000 cases had been made.

The discussion proved of much interest to foundrymen and time study men of the area who deal with evaluation and classification of jobs of this nature. Many questions were discussed.—*J. Morgan Johnson, secretary-treasurer.*

New England

DR. J. A. RIDDERHOF, director of research, Frederic B. Stevens Co., Detroit, spoke before the New England Foundrymen's association in Boston on April 10. The speaker's subject, "Foundry Facings," proved to be of more than ordinary interest and attracted an audience of 60 or more guests and members of the association. He divided the address into three main divisions. Seacoal facings, core washes and derivatives, and partings.

In discussing the first topic he said that seacoal facing effects all the physical properties of molding sand in one way or another. Usual tests run on the facing were volatile matter, sulphur, ash, and moisture. Main function of a good seacoal facing was to form a so-called gas cushion on the surface of the mold, resulting in a good finish on the casting surface. It also performs the additional function of creating a reducing atmosphere in the mold.

The speaker defined core wash as any material used to coat the surface of a core or mold. It usually is mixed with water and applied with brush, spray, or by dipping. Consistency of such solutions is important and may be kept uniform from time to time by a hydrometer in which the readings are expressed in degrees baume, or by determining the viscosity of the mixture regularly. Mechanical mixers are better in keeping the solution stirred up than mixing it by hand. The following points should be followed in mixing core wash: 1. Use a material that will mix readily. 2. Allow the solution to stand several hours before use. 3. Provide continuous agitation. 4. Have solution at proper consistency. 5. See that it soaks to proper depth in mold. 6. It must not ferment or foam on surface. 7. It must adhere firmly to the mold surface. 8. It must be sufficient heat resisting. 9. It must not crack on the surface of the mold. 10. It must peel the casting well.

Dr. Ridderhof concluded with a brief discussion of partings which he said were of various materials such as tripoli, silica, beam dust, etc., after which a very interesting general discussion and question period followed. The Swan-Finch Oil Co. was voted in as a new member of the association.—*Merton A. Hosmer.*

N. Ill. and S. Wis.

FOUNDRY refractories was discussed at the April 16 meeting of the Northern Illinois and Southern Wisconsin chapter of the A.F.A. held at Freeport, Ill. G. J. Landstrom, Sundstrand Machine & Tool Co., Rockford, Ill., and chairman of the chapter presided at the meeting at which 45 members and guests were present.

C. E. Bales, Ironton Firebrick Co., Ironton, O., spoke on "Foundry Refractories." The discussion covered the mining of clays, type of clay used, blending of clays and molding of refractories. The present product was compared with the old and it was shown why the new methods make a better refractory. Improvements for lining ladles was discussed as well as method for slag skimming and new types of linings. Use of materials for rammed linings was shown because where purite is used to treat iron, that lining has shown resistance to the action of the material. Air furnace refractory problems were covered and the improvements effected were presented. Air furnace bottom brick versus sand bottom was discussed. The meeting was followed by a question and answer period.—*Henry C. Winte, technical secretary.*

Birmingham

MODERN foundry practice was discussed by Max Kuniansky, general manager, Lynchburg Foundry Co., Lynchburg, Va., at the April 19 meeting of the Birmingham district chapter of the A.F.A., held at the Tutwiler hotel. Approximately 100 members and guests attended the meeting, and W. O. McMahon, Sloss-Sheffield Steel & Iron Co., and vice chairman of the southern chapter, presided.

Mr. Kuniansky showed slides of different types of castings made in the plants of the Lynchburg Foundry Co., and explained the methods used in producing these castings. An active discussion followed the lecture. H. J. Noble, American Cast Iron Pipe Co., Birmingham, introduced Mr. Kuniansky.—*Farrar Hill.*

Wisconsin

APRIL meeting of the Wisconsin chapter was held in the Schroeder hotel, Milwaukee, on April 19 with 300 including 50 ladies in attendance. Entertainment was supplied by Al Buettner and Joe Wesley, and the main speaker was W. J. Cameron, Ford Motor Co., Detroit, whose subject was, "Outlook for American Business."

The annual election was held at which the following were elected: President, B. D. Claffey, General Malleable Corp., Waukesha, Wis.; vice president, A. C. Ziebell, Universal Foundry Co., Oshkosh, Wis.; secretary, Howard Waldron, Nordberg Mfg. Co., Milwaukee, and treasurer, R. F. Jordon, Sterling Wheelbarrow Co., Milwaukee. New directors elected are: David Zuege, Sivyer Steel Casting Co., and Fred Pritzlaff, Falk Corp., Milwaukee.

Mr. Cameron in his address pointed out that purpose of men in business was to increase the wealth of the nation, and their two major objectives are to make their own living, and to assist others in making a living. Business is made of a network of small businesses which do the bulk of the business. In the automotive field for example 10,000 firms, names seldom heard of, make parts for the large companies, but are essential before the large firms can start operating.

He mentioned that in 1939 business men cast off fears and wrote off false hope which resulted in an improved spirit of business, and he recommended that nothing be per-

Contingent from New England Foundrymen's association photographed at Chicago convention by C. A. Wyatt, New England manager, Debevoise-Anderson Co., Boston

mitted to loosen that grip. Progress will be made only as the spirit of business continues to improve. As to the future, all that is necessary is to know the American people who have the energy and courage to work out any problem.—*A. C. Ziebell, secretary.*

New York-New Jersey

PROGRESS of the machine tool castings industry in the last 10 years has been greater than that of the preceding 20 years, declared Frank J. Dost, Sterling Foundry Co., Wellington, O., in his talk before the Metropolitan New York-New Jersey chapter of the A. F. A. at the April 29 meeting held at the Essex house, Newark, N. J. Introduced to an audience of about 55 members and guests by technical chairman, J. N. Vanick, International Nickel Co., New York, N. Y., Mr. Dost gave a resume of the machine tool casting field and described the trend during the past 10 years from high carbon gray iron to low carbon compositions which are today in common use.

With high carbon machine tool castings trouble was encountered in securing uniform properties in the sections which varied from ⅜ to 4 inches. Use of alloys helped to reduce the variation. With the increasing demand for greater uniformity, finish and wear resistance, the machine tool foundries employed lower carbon irons. Castings containing from 2.7 to 3.0 per cent total carbon were found to be less sensitive to sectional variation, one mixture serving where 2 or 3 were required for the formerly used high carbon iron.

With higher strength machine tool castings, scoring and galling of wearing surfaces occurred. An extended investigation established that presence of a dendritic type graphite structure and associated free ferrite were responsible for the poor wearing characteristics. Low carbon content and the use of melting temperatures of 2850 degrees Fahr. and over were found to be responsible in a large part for producing the undesirable structure.

Subsequent experiments demonstrated that graphitizing ladle additions served to maintain a normal graphite structure and a fully pearlitic matrix, and resulted in an iron possessing excellent resistance to scoring and galling. Silicon content of the base metal was reduced and the practice of adding silicon to the ladle was established in daily production. That has resulted in adequate control of the metal structure to insure that wearing surfaces on machine tool castings will be of the desired quality. The discussion following Mr. Dost's talk gave evidence of the keen interest in the subject of wear resistance.

During the business meeting preceding the technical session the following officers were elected for the coming year: Chairman, R. J. Allen, Worthington Pump & Machinery Co., Harrison, N. J.; vice chairman, J. W. Reid, Robins Conveying Belt Co., Passaic, N. J.; secretary, W. A. Phair, *The Iron Age;* and treasurer, R. E. Nesbitt, Pratt institute, Brooklyn, N. Y. Earlier in the evening a sound film, "Flagships of the Air," was shown through the courtesy of the American Airlines, Inc.—*K. A. DeLonge, technical secretary.*

Central New York

CENTRAL New York chapter of the A. F. A., held its regular meeting on April 19 at Willard Straight hall, Cornell university, Ithaca, N. Y., with Chairman H. H. Judson presiding. Prof. W. N. Barnard, director of the department of mechanical engineering, welcomed tne visiting foundrymen in behalf of the University. Mr. Judson introduced Dr. Ries and Prof. Wells of Cornell university, and stated that they and the speaker of the evening, H. W. Dietert, Harry W. Dietert Co., Detroit, were responsible for the original sand testing equipment.

Mr. Judson then called for a report from the nominating committee which was presented by G. M. Thrasher, R. Lavin & Sons Inc. Officers nominated were: Chairman, Frank Wheeler, Kimman & Wheeler, Syracuse, N. Y.; vice chairman, E. J. Bair Sr., Utica Radiator Corp., Utica, N. Y.; secretary, L. D. Wright, United States Radiator Corp., Geneva, N. Y., and treasurer, Harold Boardman, Elmira Foundry Co., Elmira, N. Y. Director for two years to fill unexpired term of Harold Boardman, Leo P. Fedigan, International Harvester Co., Auburn, N. Y.; directors for three years: H. H. Judson, Goulds Pumps, Seneca Falls, N. Y.; Prof. A. C. Davis, Cornell university, Ithaca, N. Y., and Curtis M. Fletcher, Fairbanks Co., Binghamton, N. Y.

Harry W. Dietert, speaking on the effect of molding sand on physical and mechanical properties of castings, stressed the great influence of moisture content which increases chill and reduces fluidity as it increases. Moisture increase also reduces deflection or ductility. Referring to permeability of sand the speaker stated that rate of heat transfer increased with increase of that property, and in turn the chill depth and porosity of the metal were affected. Mr. Dietert used numerous lantern slides to illustrate his talk, and an interesting question and answer period followed. The latter has come to be an accepted part of each meeting, and it is apparent that foundrymen present are taking full advantage of the educational opportunities offered.—*L. D. Wright, secretary.*

New Jersey

DECLARING that silicosis is not as prevalent in the foundry industry as has been supposed, Dr. Leonard Greenburg, director, New York state division of industrial hygiene, Albany, N. Y., outlined results of a survey of New York state foundries before members of the New Jersey Foundrymen's association at the Downtown club, Newark, N. J., Monday evening, April 8.

His survey was begun in 1937, following passage of a New York state law making silicosis a compensable disease. It was his observation that the industry is comprised principally of older people. This combined, with the fact that silicosis is very slow in developing, makes for a greater liability than otherwise. In fact, the problem of accrued liability which is presented as a result of this combination calls for serious consideration, he declared. He said there was relatively little silicosis among employes who had not been engaged in foundry work for more than 15 years, and that less than 1 per cent had any traces of the disease who had been employed under 4 years.

Dr. Greenburg declared that the primary line of attack should be prevention. He thought that a great deal could be accomplished by observing the ordinary rules "of good housekeeping." Observance of such rules would virtually solve the problem for a great number of foundries, he believed. In addition to adequate control of dust, foundrymen should take every pains to take care of new cases as they occur and to study the problem of accrued liability, with a view of ascertaining "how they were going to liquidate it."

He remarked that claims in New York so far have not been nearly as numerous as had been expected at the time the law was first drawn up. Dr. Greenburg said this could be accounted for in part by the fact that death might come as a result of many causes, in which silicosis had little or no important bearing.

He said that the New York state act provided for the establishment of a medical board, comprising leading authorities on pulmonary diseases, adding that it was highly desirable to have physicians, whose judgment and integrity were above question, pass on cases. He said that in his opinion silicosis had lit-

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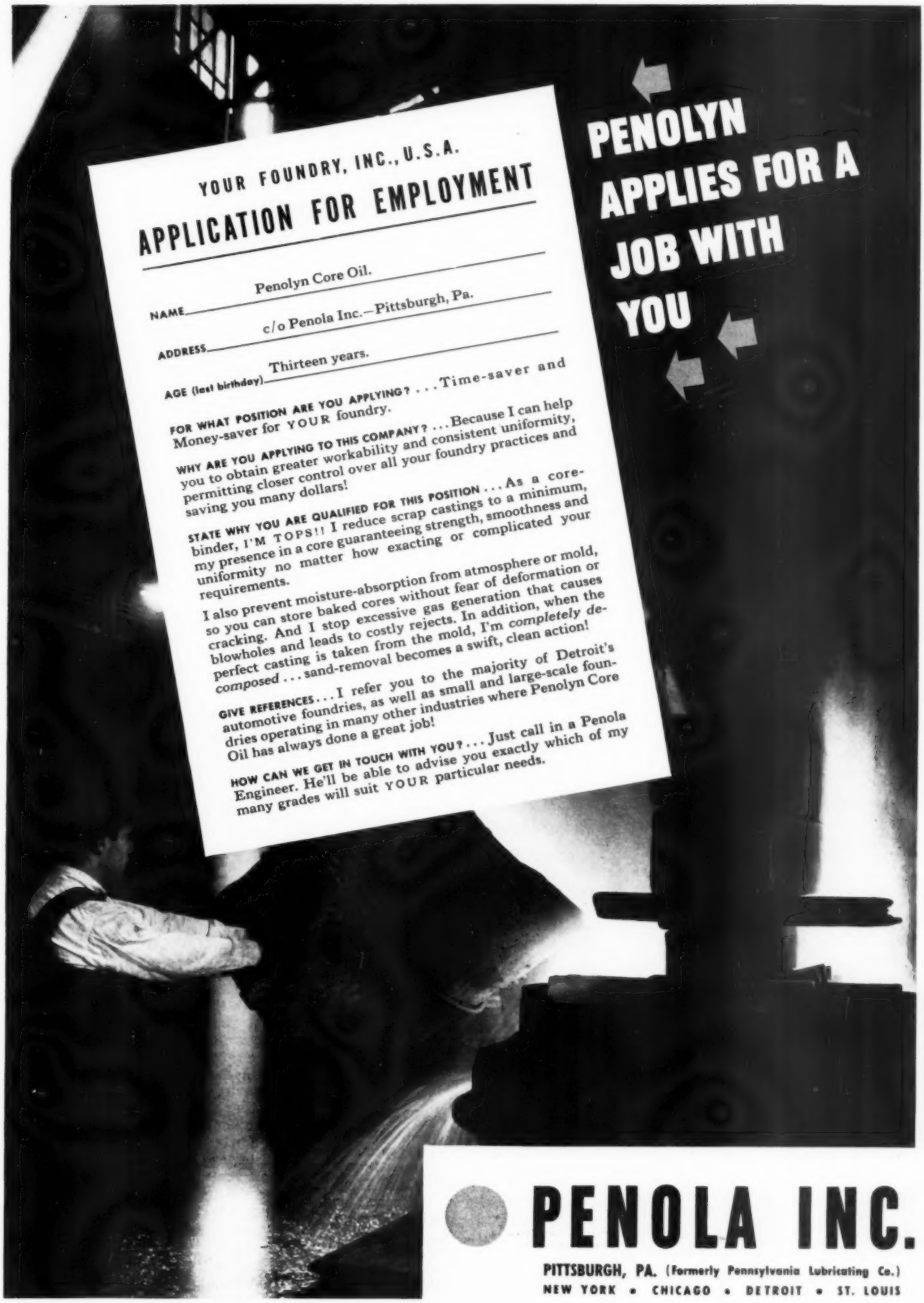
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WHY ARE YOU APPLYING TO THIS COMPANY? . . . Because I can help you to obtain greater workability and consistent uniformity, permitting closer control over all your foundry practices and saving you many dollars!
STATE WHY YOU ARE QUALIFIED FOR THIS POSITION . . . As a core-binder, I'M TOPS!! I reduce scrap castings to a minimum, my presence in a core guaranteeing strength, smoothness and uniformity no matter how exacting or complicated your requirements.
I also prevent moisture-absorption from atmosphere or mold, so you can store baked cores without fear of deformation or cracking. And I stop excessive gas generation that causes blowholes and leads to costly rejects. In addition, when the perfect casting is taken from the mold, I'm *completely de-composed* . . . sand-removal becomes a swift, clean action!
GIVE REFERENCES . . . I refer you to the majority of Detroit's automotive foundries, as well as small and large-scale foundries operating in many other industries where Penolyn Core Oil has always done a great job!
HOW CAN WE GET IN TOUCH WITH YOU? . . . Just call in a Penola Engineer. He'll be able to advise you exactly which of my many grades will suit YOUR particular needs.
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PENOLA INC.
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(*Continued from page 70*)

tle relation to tuberculosis, except in the third stage of the former.—*B. K. Price.*

Philadelphia

METROPOLITAN Philadelphia chapter of the A.F.A. had another fine turnout at a meeting held April 12 at the Engineers club, Philadelphia. One hundred and ten sat down to dinner and later were treated to a marvelous all colored sound motion picture entitled, "Canadian Rockies Holiday." Dr. G. H. Clamer was selected as technical chairman and as it was the forty-ninth anniversary of the founding of the old Philadelphia Foundrymen's association (April, 1891) some of the "old timers" were invited guests and included the following: Messr. Hopkins, Ajax Metal Co.; Thum, Palmyra Foundry Co.; Newcomb, Rogers, Brown-Lavino Co.; Himmelright, Bethlehem Steel Co.; Bishop, Florence Pipe & Foundry Co.; Coppage, Pusey & Jones Corp.; and Dr. Clamer, Ajax Metal Co.

It was quite a coincidence that the speaker, William J. Shennan, now foundry consultant for Taggart & Co., was also the speaker at the first meeting of the Philadelphia Foundrymen's association 49 years ago, and he spoke on the same subject, "Foundry Practice." Mr. Shennan, who spent 60 years of his life in the foundry, is quite an authority on foundry operations, not only in this country, but also abroad. He had no set paper but reminisced, to the delight of the audience, on the trials and errors encountered by foundrymen in the "days gone by."

Mr. Shennan stressed good housekeeping as all important for successful foundry operations. Cleanliness, proper location of cupola, tuyere size and location, proper lining and type of material for lining and patching cupola and ladles, and various methods of charging all were discussed in the light of his varied experience in the Bethlehem Steel Co. foundries. It soon developed into a "Question and Answer" meeting and many interesting discussions brought out salient points that were of real interest and benefit to the members.

The nominating committee presented the following report for officers for the coming year: Chairman, R. J. Keeley, Ajax Metal Co.; vice chairman, J. H. S. Spencer, H. W. Butterworth & Sons, Bethayres, Pa.; and secretary-treasurer, W. B. Coleman, W. B. Coleman Co. Board of directors for 3 years, D. J. Peake, Florence Pipe Foundry & Machine Co., Florence, N. J.; and J. T. Fegley, North Bros. Mfg. Co. —*J. T. Fegley, chairman, publicity committee.*

St. Louis

ONE of the largest crowds of the year attended the April 11 meeting of the St. Louis District chapter of the A.F.A. The meeting was in charge of Chairman L. E. Everett. During the business session special emphasis was given the National convention and special attention was directed to the apprentice training contest held by the chapter prior to the national contest in Chicago.

During the course of the business session, which included various committee reports, etc., the chapter voted not to have a regional conference this year. It was reemphasized that the St. Louis chapter has extended an invitation to the National organization to visit St. Louis in the convention during 1941.

Following a brief intermission, Ray Fleig, Smith Facing & Supply Co., Cleveland, was introduced by Vice Chairman W. Carter Bliss. Mr. Fleig's subject, "Foundry Facings, Their Manufacture and Application," was most favorably received by the group, the subject being of general interest. Welcome was given to Mr. Fleig as vice chairman of the Northeastern Ohio chapter.

The next speaker was W. H. Spencer of the Wilkening Mfg. Co., Philadelphia. Mr. Spencer's subject was "Fluidity in General." As chairman of the fluidity committee of A.F.A., Mr. Spencer's experience, education and training made it possible for him to give a talk and to contribute materially toward a general round table discussion that followed.—*J. W. Kelin, secretary-treasurer.*

Northern California

NORTHERN California Chapter of the A.F.A., held its regular meeting on April 12, at San Francisco, with an attendance of 54. Vice Chairman, Ivan L. Johnson, Pacific Steel Casting Co., acted as chairman and reported on the April 1 meeting of the directors. He noted that the chapter's finances were in good shape, and that the loss of a few members through the year, from various causes, had been more than offset by the new members received, bringing the total to 78. This set a new record for the chapter, with several more applications under consideration.

Program chairman reported that the annual meeting for June 14 would be held at the Lake Merritt hotel, Oakland. Mr. Russell was called on to report the recommendation of the nominating committee, which was: Chairman, Ivan L. Johnson, Pacific Steel Casting Co., Berkeley; vice chairman, E. M. Welch, American Manganese Steel Co., Oakland; secretary-treasurer, G. L. Kennard. Directors for 2-year term, John S. Fowler, Pacific Foundry Co., J. L. Francis, Vulcan Foundry Co., Oakland, B. C. Page, F. K. Simonds Co., Berkley, and P. C. Valentine, Del Monte Properties Co.

Acting Chairman Johnson then introduced the coffee speaker, Phillips E. Geauque, San Francisco office of the U. S. secret service, who showed sound movies on, "Know Your Money." Principal speaker was John H. Spillane, Electro Metallurgical Corp., who showed several slides illustrating his paper, "Final Deoxidation of Cast Steel," based on the work done by Walter Crafts, John J. Egan, and W. D. Forgeing, Union Carbide & Carbon Research Laboratories. Keen interest was demonstrated in the subject by the questions and answers which followed the talk.—*George L. Kennard, secretary.*

Pittsburgh

ELECTRIC furnace construction, operation and use was discussed at the April meeting of the Pittsburgh Foundrymen's association. Principal speaker at the gathering, attended by 125 members and guests, was Frank W. Brooke, Swindell-Dressler Corp., Pittsburgh, whose subject was, "Electric Furnace as Applied to the Melting of Steel and Iron." J. H. Johnston, Westinghouse Electric & Mfg. Co., and president of the association, presided.

Mr. Brooke discussed application of electricity in melting practice, pointing out its shortcomings as well as the inherent advantages. Close control of temperature in the electric furnace according to the speaker, does more than any other single factor toward producing a better metal and subsequently better castings. Recent developments have made the processes using electricity even more flexible than before, and improvements in equipment and technique in the charging operation have simplified the job to some extent.

With the aid of slides, Mr. Brooke illustrated the various steps from raw materials to molten metal via the electric furnace process. As an added feature to tie in with this program, motion pictures demonstrating the manufacture of various types of refractory bricks were shown by the Harbison-Walker Refractories Co. Discussion leader for the evening was George H. Zoerb, Sharpsburg Foundry Co., Sharpsburg, Pa.

Annual report of the nominating committee, giving the slate of officers for 1940-41, was presented. R.

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(*Concluded from page 72*)

C. Heaslett, Continental Roll & Steel Foundry Co., was named to the presidency, succeeding Mr. Johnston. Leo F. Kelly, Fort Pitt Malleable Iron Co., will succeed Mr. Heaslett as vice president, while C. H. Paul, Mackintosh-Hemphill Co., has been renominated for secretary-treasurer.

Nominations for the executive committee include H. P. Spilker, Sterrit-Thomas Foundry Co.; T. A. Reynolds, McConway & Torley Corp.; H. M. Wilson, Taylor-Wilson Mfg. Co.; H. B. Reed, Westinghouse Air Brake Co., and C. I. Niedringhaus, Mesta Machine Co. The new officers will take over after the annual outing in June. Details of the outing were announced by J. M. Stewart, chairman, entertainment and reception committee. Date has been set for June 10, at South Hills Country club.—*Robert L. Hartford.*

Northeastern Ohio

NEARLY 150 members and guests attended the meeting of the Northeastern Ohio chapter of the A.F.A. on April 11. Chairman E. F. Hess presided. J. H. Tressler, secretary, announced the new membership campaign sponsored by the national association which is offering $100 to the chapter showing the greatest percentage increase by June 30. Coffee talk following the dinner took the form of an interesting colored motion picture entitled, "Industrial Oddities," and was presented by Mr. Adams, Standard Oil Co. of Ohio.

Main speaker of the evening was Edwin C. Barringer, executive secretary, Institute of Scrap Iron and Steel, New York, whose topic was, "Scrap—Cinderella of Raw Materials." He pointed out that while the layman's conception of a scrap dealer was the typical junkman, that in reality scrap collection and handling was a major industry. During 1939 nearly 19,000,000 tons of iron and steel scrap were sold by dealers of which approximately 79 per cent was for domestic consumption. On the basis of $16 per ton, the value would be about $300,000,000 with one turn over. Usually scrap is turned over twice.

Largest sources of scrap are the railroads, supplying around 1½ million tons, fabrication of iron and steel about 4 million tons, and scrap automobiles a little over 2½ million tons. Greatest consumers of iron and steel scrap are the open hearth furnaces, which account for 70 per cent, foundries which use 20 per cent, and blast furnaces and other miscellaneous applications which employ 10 per cent. It is estimated that of the 7 million tons of scrap used by the foundries that 6,300,000 tons are melted in cupolas and the remainder in air, electric and other types of furnaces.

In closing Mr. Barringer pointed out that of necessity buying, handling and selling of scrap iron and steel involve considerable speculation. However, the scrap industry would like nothing better than a steady, continuous purchase of scrap by consumers month in and month out, which would eliminate the peaks of high prices and the valleys of low prices.—*Edwin Bremer.*

Ontario

AT THE meeting of the Ontario Chapter of the A.F.A. held March 29 at the Carls-Rite hotel, Toronto, Joseph Sully, Sully Brass Foundry, Ltd., and chairman of the reports and publicity committee, presided, and Dr. W. F. Chubb spoke on the "Casting of Magnesium Alloys." Nominations also were presented for the officers and directors for the next year to be voted on at the next regular meeting.

R. E. Kennedy, secretary, A.F.A., brought greetings to the chapter from headquarters. Another visitor from the United States was A. W. Winston, director, metallurgical department, Dow Chemical Co., Midland, Mich.

Dr. Chubb pointed out that the lightness of magnesium alloys and their good strength when compared with other materials on the basis of weight, were important factors in promoting increased use, especially in aircraft. Alloying additions to magnesium do not exceed 12 per cent in the range of useful alloys and consist principally of aluminum, zinc, and manganese, with copper, lead, silicon, etc., sometimes used.

Molten magnesium alloys must be protected from the action of water in green sand molds by the addition of sulphur, ammonium fluoride, boric acid or phosphates. Sand used should have high permeability. Surface defects in magnesium alloy castings often may be traced to the presence of organic material or agglomerates of sulphur in the sand.

It is usually good practice to superheat magnesium alloys to 1500 degrees Fahr. and to cool to 1400 to 1450 degrees Fahr. before pouring to get a fine grain structure. Properties of sand cast magnesium alloy parts may be improved considerably by suitable heat treatment. Temperature, time of heating, and method of cooling or quenching varies with the alloy and the particular properties desired.

Over 100 attended the April meeting of the Ontario chapter held at the Rock Garden lodge, near Hamilton, to hear incoming vice chairman, N. B. Clarke, Steel Co. of Canada, Ltd., Hamilton, give an illustrated lecture on the manufacture of pig iron, and to enjoy that fine fellowship that grows with every meeting as members become better acquainted. Most important business item of the meeting was the election of the officers for 1940-41, as follows: Chairman, D. M. Storie, Fittings, Ltd., Oshawa; vice chairman, N. B. Clarke, Steel Co. of Canada Ltd., Hamilton; secretary-treasurer, S. R. Francis, Metals and Alloys, Ltd., Toronto, and assistant secretary, R. Banks, Metals and Alloys, Ltd., Toronto. Directors for 1 year term: O. W. Ellis, Ontario Research Foundation, Toronto; W. R. Barnes, W. R. Barnes, Ltd., Hamilton; and J. J. McFadyen, Galt Malleable Iron Co. Ltd., Galt. Directors for 2-year term: J. Thwaites, Beatty Bros., Ltd., Fergus; J. Reid, Canadian Westinghouse Co. Ltd., Hamilton, and C. C. MacDonald, F. B. Stevens Co., Ltd., Toronto. Directors for 3-year term: J. C. Stavert, Babcock-Wilcox & Goldie-McCulloch, Ltd., Galt; N. C. McPhee, McKinnon Industries, Ltd., St. Catharines, and T. A. Rice, International Harvester Co. of Canada, Ltd., Hamilton.

Secretary-treasurer S. R. Francis was given a big hand for his past year's work and for his willingness to carry the burden for another year; and retiring chairman D. J. Macdonald received recognition for the important part that he played in the successful season enjoyed.

Describing the production of pig iron, N. B. Clarke pointed out that blast furnace is, along with the cupola, still the most efficient of metallurgical processes, and it has not been found economically sound to convert iron ore directly into steel. A typical modern blast furnace is roughly 90 feet high and 20 feet in diameter, has a volume of 20,000 cubic feet and has a 36-inch lining of first quality fireclay brick. Charging the furnace without loss of gas from the top is effected by the use of two charging bells. The hot gases from the furnace preheat the air being blown to the tuyeres and then are utilized for their fuel value in various parts of the plant. Molten iron is tapped out through the iron notch which is at the bottom of the brick lining of the furnace. General practice is to tap a furnace about every 4 hours but since there is not enough room between the iron level and the tuyeres to hold all the iron and slag, about one-half the slag must be drawn off through the cinder notch between casts. Running full blast an average furnace will require in 24 hours about 1200 to 1300 tons of ore, 500 to 600 tons of coke, 300 to 350 tons of limestone, and 2200 tons of air to make 700 tons of iron, 300 tons of slag and 3000 tons of gas.—*Joseph Sully, director.*

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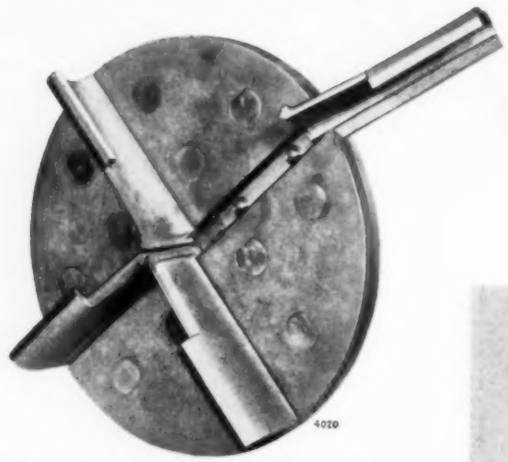

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The blast is concentrated and directionally controlled for greatest blasting force.

The blower imparts initial velocity to the abrasive and distributes it uniformly over the blades.

This initial velocity, plus centrifugal velocity created by the wheel, assures a more powerful blast.

Longer blades add velocity and uniform distribution to abrasive, hence greater cleaning force.

All this results in more effective blast cleaning.

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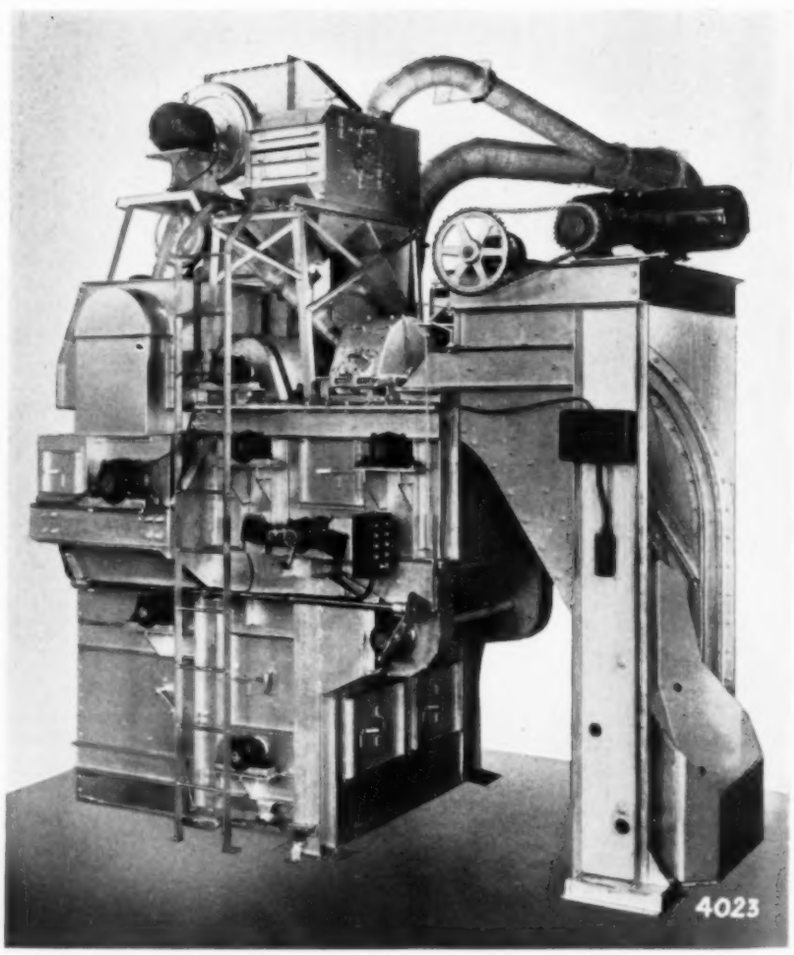

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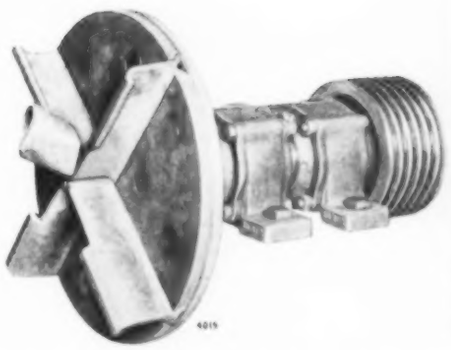
A Sly Centri-Blast Rotary Table, with variable speed table drive.



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No moving or wearing parts at abrasive feed—no crushing of abrasive—no pulsating feeding of abrasive to blades.

Special alloy wear plates on rotor, housing liners and other parts, cast sectional, permitting quick and easy replacement and reducing idle time and costs to a minimum.

Special alloy blades are so designed and held in the wheel that less time is required to replace them.

These features assure lower operating costs.

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HOLD EIGHTH ANNUAL CONFERENCE AT Michigan State

MELTING of metals, their solidification the effects of mold materials constituted the theme of the eighth annual conference on foundry practice, held at East Lansing, Mich., April 12 and 13 under auspices of Michigan State college and the Detroit chapter of the A.F.A. Approximately 150 were in attendance at the two-day meeting, a somewhat larger assemblage than that of last year. Three technical sessions were interspersed with a luncheon and banquet.

Qualifications of the ideal melter in the gray iron field were enumerated by Don J. Reese, International Nickel Co. Inc., New York. In the first place, the ideal melter analyzes the prevailing conditions in his foundry area and the product his foundry wishes to produce. If he can purchase electric power for less than 3 mills per kilowatt hour he probably will produce iron in an electric furnace, provided his firm has sufficient capital to buy this type of equipment. If power costs from 12½ to 20 mills, he probably will melt in some other type of furnace.

If his problem is one of supplying a mold conveyor with a continuous supply of metal, he knows that one furnace only in the foundry industry melts continuously—the cupola—although there are various ways of combining batch-type melting units with holding furnaces to provide continuous iron supply. Various combinations possible, some of them used in this country, include two cupolas, cupola and electric furnace, cupola and air furnace, and even a linking of blast furnaces, cupolas, mixers, electric furnaces and air furnaces in one metal circuit, as at one automotive plant.

Bell Tower on Michigan State Campus

The ideal melter, in Mr. Reese's opinion, accurately weighs everything that goes into the charging door of the cupola and makes an attempt to do the same thing with the cupola air supply. Errors in weighing have a definite bearing on metallurgical control and the function of weighing has changed from one of inventory control to metallurgical control. Weighing also has been extended to the measurement of molten metal taken away from the cupola, to assure that ladle additions, if made, will be made to the correct amount of metal.

The ideal melter avoids buying just a good grade of foundry coke and asks his purchasing department for a definite size in screened coke of a type most suited to his type of iron. He is using a coke sized to about one-twelfth of the cupola dimeter and attempts to keep the length of materials in his iron charge down to 30 per cent of the cupola diameter. The ideal melter is using new methods developed to analyze his iron rapidly for control purposes, which include the spectrograph, and electrical and chemical methods for rapid determination of elements.

A new phase in the ideal melter's thinking is an appreciation of the flexibility of the cupola melting unit. The usual charge for a 72-inch inside diameter cupola has been 4000 pounds, in some cases 3000 pounds, but in others as much as 12,000 pounds. Actually, excellent results may be obtained with charges as small as 1000 pounds. A 36-inch cupola will do a good job with a charge as small as 250 pounds.

Cupola metal temperatures are frequently above 2800 degrees Fahr. and occasionally approach 2900 degrees, but the temperature at this point may be related only mildly to the pouring temperature, which may be as low as 2450 degrees. Metal temperature losses in handling, even in a well equipped and well supervised metal handling circuit, are seldom less than 200 degrees and may exceed 500 degrees. The ideal melter is less concerned with the theories of superheating than he is with expediting his metal handling circuit to get metal into molds at higher temperatures.

Developments in nonferrous melting equipment were covered by G. K. Eggleston, Detroit Lubricator Co., Detroit. Prefacing his remarks with

(*Concluded on page* 80)

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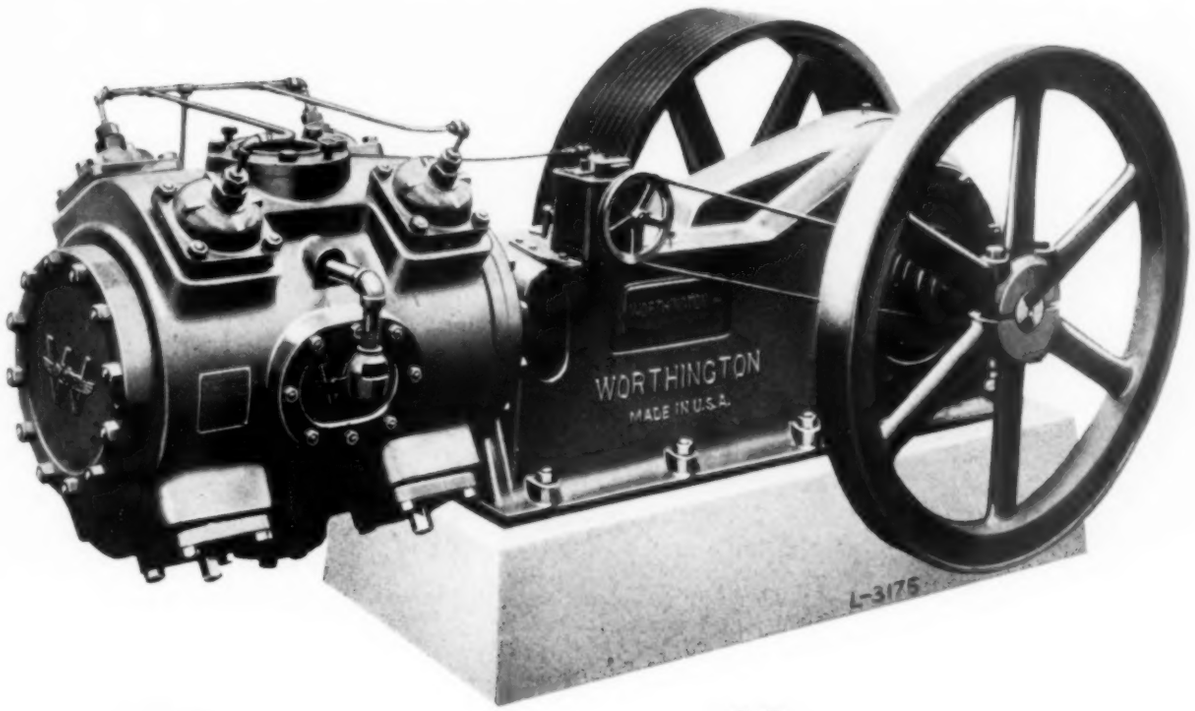

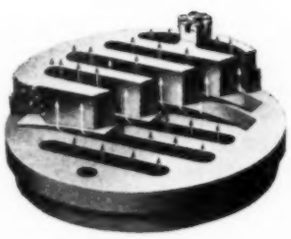

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(*Continued from page 78*)

a brief historical review of the progress of nonferrous melting furnace from the inception of bronze melting some 6600 years ago, Mr. Eggleston then examined the various types of units in operation today. In the case of the coal or coke fired crucible furnace, he saw no recent changes in this class of equipment. He noted real effort, however, being devoted to improve gas and oil fired crucible furnaces, with two objects in mind—better fuel economy and reduction in metal losses.

Principally due to research efforts of gas companies, burners now are available which operate at high efficiency and permit the melter to maintain a neutral or any degree of oxidizing atmosphere desired. Further to reduce melting losses, use of tilting crucible furnaces of the sealed-in type is gaining favor. In that type of furnace the flame is exhausted through a flue in the furnace shell so that the furnace atmosphere cannot come into contact with the metal.

Electric Furnaces Improved

Neither of the electric furnaces, the indirect arc or the induction type, have undergone any basic changes since their introduction, Mr. Eggleston observed, but manufacturers of electric furnaces have made sincere efforts to improve their units electrically and mechanically. Not the least of these improvements has been in regard to transformers. Rocking mechanisms also have been perfected to prevent spilling and to start the rocking motion automatically at a predetermined time and to increase it according to requirements.

Refractories have been improved considerably in the past 20 years, the speaker noted, silicon carbide being used extensively in all types of crucible furnaces, as well as in the open-flame and, to a lesser extent, in the indirect arc furnaces. Numerous insulation materials, capable of withstanding temperatures up to 2500 degrees Fahr., now are available. Superduty firebrick also has permitted economies because of its adaptability in applications formerly requiring higher-priced refractories.

In the field of steel melting, C. E. Sims, Battelle Memorial institute, Columbus, O., pointed out that the objectives continue fundamentally the same—obtaining a steel that is hot enough and fluid enough properly to fill the mold cavity, to solidify with entire freedom from gas formed cavities and to develop suitable physical properties.

Referring to the fallacy of the belief that steel can be damaged permanently by over-oxidation, Mr. Sims observed that oxygen now is becoming recognized as a beneficial and probably indispensable element in steelmaking. The role of enemy No. 1, formerly held by oxygen, now is being transferred to hydrogen, with nitrogen playing a similar but less important part.

Examining in detail the mechanics of steel refining in the melting furnace, the speaker pointed out that hydrogen is introduced to steel from rust on scrap, moisture or hydrogen in the atmosphere and moisture in slagmaking materials in the early part of the heat. This largely is removed by an adequate boil. The critical time for hydrogen absorption is after the deoxidation when the solubility is higher and there is no chance for its removal. Principal sources then are the atmosphere, improperly dried ladles and molds.

Deoxidizers Are Needed

Study of the deoxidation of steel shows that strong deoxidizers are needed to prevent porosity due to hydrogen and nitrogen. Aluminum is of course the strongest of the common deoxidizers, but unless there is at least a small excess there can be no guarantee of efficient deoxidation.

Mr. Sims declared it has long been considered that of the three principal steelmaking furnaces, the converter represented one extreme and the electric furnace the other, with the open hearth somewhere between. Present knowledge indicates no difference in the fundamental principles involved in making good steel in any of them. Converter steel is noted for its high fluidity and comparative freedom from pinhole trouble, and the beneficial boil is inescapable in the open hearth. The electric furnace, on the other hand, represents the greatest degree of flexibility.

He added that when castings are produced on a large enough scale there is no question but that the open hearth is the proper melting unit. For continuous production on a small scale the electric furnace is the least expensive and most efficient unit.

Melting requirements for production of pearlitic malleable iron were outlined by Carl F. Josephs, Saginaw Malleable division, General Motors Corp., Saginaw, Mich. Stressing the fact that melting for pearlitic malleable is far more exacting than for regular malleable iron, he attributed the difference to the necessity for more careful control of all raw materials entering into production of the product.

Two ways were suggested to approach the problem of obtaining uniform raw materials. One is to continue to train personnel along technical lines, and to develop an attitude of responsibility and teamwork throughout the producing organization. The other is in research on the basic principles underlying the metallurgical aspect of ironmaking methods, including new aids in the control of the process and new types of equipment to do a better job.

Application of pearlitic malleable in the automobile and allied industries is mainly in the replacing of drop forged steel parts, such as rocker arms, camshafts, shifter yokes, gears and crankshafts. In general, pearlitic malleable is melted with the same type of equipment used for malleable iron castings—the air furnace, cupola-air furnace or cupola-electric furnace. Raw materials used in the various processes are somewhat different. In using the air furnace a high percentage of malleable pig, running 2 per cent silicon, is used, with a low percentage of steel, whereas in the cupola processes generally a much higher percentage of steel scrap is used with silvery pig iron. In the cupola process, coke is used as the fuel and is one of the important raw materials affecting properties of the resulting iron. Uniform sized coke is desired, free from green ends and porosity. The most desirable size is about 4 to 5 inches across.

Depend on Pig Iron

Properties of pearlitic malleable castings are dependent largely upon the characteristics of the pig iron used, Mr. Josephs noted. Close cooperation between blast furnace and foundry is necessary. Whenever a new run of pig iron is made, the foundry contacts the blast furnace to make a study of the ores, coke and practice to be followed. A log covering the iron is made out and recorded. Chemical analysis of the pig iron is made for carbon, silicon, manganese, phosphorus and sulphur, which must fall within certain specified limits. Alloying elements necessarily are absent. Ores used also are free from chromium, tin or other carbide stabilizers.

Microscopic examination of the pig is a routine test of importance. From the annealing angle the microstructure should reveal little or no steadite. Graphite size in the pig also has marked influence on resultant properties of the castings.

Mechanics of the solidification of cast iron were reviewed academically by Dr. R. Schneidewind, University of Michigan, Ann Arbor, Mich. He observed that the temperature at which metal freezes determines the properties and type of grain, which cannot be destroyed completely, even after annealing. Discussing gray cast iron specifically, he pointed out that equilibrium

(*Concluded on page 82*)

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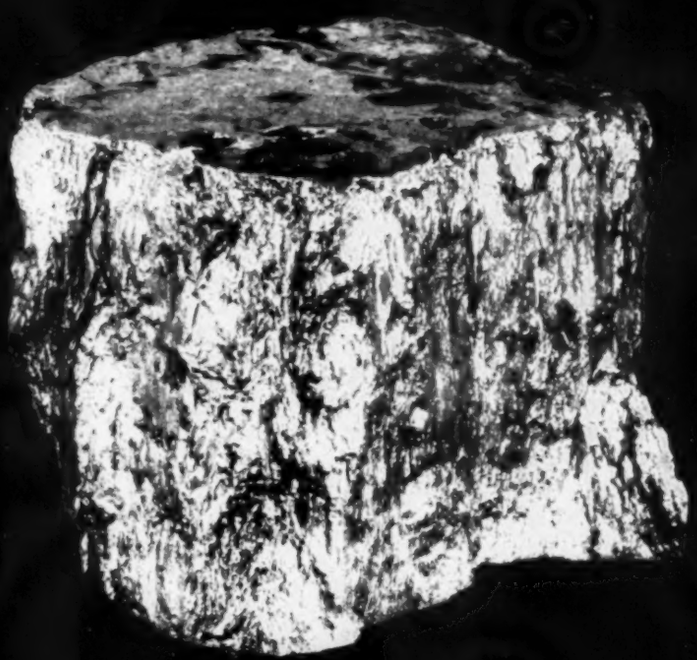

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diagrams do not represent exactly what is obtained in foundry practice, as far as metal structure and freezing temperatures are concerned.

To correlate cooling rates with properties and to determine actual temperatures at which metal solidified, Dr. Schneidewind made tests on a number of wedge-shaped castings, 3 inches wide at the base with a 12-degree taper. Because of the variation in section there was naturally a wide variation in type of microstructure and in solidification temperature from 1800 to 2030 degrees Fahr. By making up wedges of various types of irons with different types of treatments in the ladle, it was possible to obtain an interesting picture of solidification details, chill effects, undercooling and like matters. Some rather remarkable micrographs at 2000 diameters of the metal structures in various zones of these wedges were displayed.

Mold Materials Affect Castings

Demonstrating that mold materials have an appreciable effect on size and distribution of defects in castings, H. L. Womockel and C. C. Sigerfoos of the metallurgical department of Michigan State college, presented an absorbing summary of their research into this subject which was reported on in greater detail at the A.F.A. convention in Chicago. Using a standard ball-shaped casting, later sectioned to reveal piping and other defects, these investigators poured samples in a variety of molds, at different temperatures, and then postulated effects of the different variables on the resultant castings. In one instance, shrinkage experienced with green sand molds was cured by a change to a dry sand mold. Little effect was noted on steel castings made in molds with different hardness. Moisture effects and the use of clay bonds seemed to have minor effects.

The authors extended their studies to a double-type mold, pouring two identical castings in a mold made of different types of sand, with the castings having a common gate and an arrangement for bleeding the metal out of the bottom of the mold to leave a shell of metal in the mold. Comparing green and dry sand, it was concluded that solidification was about at the same rate. The authors further concluded that mold materials expand when hot metal is poured into them, that metal abnormality promotes shrinkage defects, that steel is less susceptible than gray iron to appearance of these defects.

Mechanical properties of cast round bars as affected by mold characteristics were summarized by Harry W. Dietert, Harry W. Dietert Co., Detroit. By changing moisture content of sands and the permeability of these sands, variations were detected in appearance of fractures, and in transverse strength and microstructures of the arbitration bars. Moisture content of four sands tested was 0, 6.2, 6.6 and 7.4 per cent. Permeability was varied from 35 to 170. Lower strengths were noted in bars from molds with high moisture content, as well as finer grain size. Higher permeability gave deeper chill and lower strength.

Effects of different mold materials on properties of aluminum sand castings were reviewed by M. H. Gould, Aluminum Co. of America, Cleveland. He cited as the most important observable effect of varying mold materials the chilling of the castings, as well as appearance factors such as pinhole porosity, blowholes and the like. Higher permeability of sands gave increases in tensile strengths and elongation, but at the same time a rougher surface was produced on the casting. Moisture appeared to be an important factor, especially in control of pinhole porosity, 9 per cent moisture in the sand giving serious porosity, while 6 per cent did not.

Material studied was a 4½ per cent copper heat treated aluminum alloy, both in the form of test bars and commercial castings. Thermal effects were examined by making molds of plaster, natural sand and silicon carbide sand. Silicon carbide sand appeared to give the fastest cooling rate, with natural green sand second and plaster third. Tensile strengths of castings increased with change of mold material, in the order of plaster, natural sand, silicon carbide and cast iron. Grain size increased in reverse order.

A.F.A. Apprentice Winners

Gray Iron Molding

First—Thomas F. Murphy, Brown & Sharpe Mfg. Co., Providence, R. I.

Second—Frederic Edstrom, International Harvester Co., Rock Island, Ill.

Third—Harold Downey, International Harvester Co., Rock Island, Ill.

Steel Molding

First—Melvin Amole, Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa.

Second—Robert Darmour, Crucible Steel Casting Co., Cleveland.

Third—Joseph Birkenheuer, Crucible Steel Casting Co., Cleveland.

Nonferrous Molding

First—Emmett Klessig, Wisconsin Aluminum Foundry Co., Manitowoc, Wis.

Second—Steve Garbowitz, Allis-Chalmers Mfg. Co., West Allis, Wis.

Third—Robert Ashley, Waukesha Foundry Co., Waukesha, Wis.

Patternmaking

First—John L. Mahon, H. & B. American Machine Co., Pawtucket, R. I.

Second—Marvin Bergstrom, Kearney & Trecker Co., West Allis, Wis.

Third—Alan Miller, American Steel Foundries, East Chicago, Ind.

Described Radio Broadcasting

Annual banquet in the Union Memorial building on the Michigan State campus was attended by about 130. Toastmaster was William Otto, secretary of the Lansing chamber of commerce, who regaled the audience with his limitless fund of humor and introduced the speaker of the evening, L. B. Barnhart, speech department, Michigan State college.

Mr. Barnhart gave an illuminating discussion of current activities in both commercial and educational fields of radio broadcasting, and told many anecdotes of his years in production and direction of national radio shows out of Chicago.

Nominating committee of the Detroit chapter announced selections for officers for the term 1940-41 as follows: Chairman, Glen Coley, Detroit Edison Co.; vice chairman, V. A. Crosby, Climax Molybdenum Co.; secretary, Harry Deutsch, Aluminum Co. of Amerira; and treasurer, W. B. Bowring, Frederic B. Stevens Inc.

N.F.A. Offices Moved

After being located at 29 South LaSalle street, for the past 28 years, the National Founders' association has moved its offices to 120 South LaSalle street, Chicago.

Evening Graduate school, Stevens Institute of Technology, Hoboken, N. J., will offer next year 45 courses in 34 different subjects covering five general fields of engineering. General divisions include chemistry and chemical engineering, economics of engineering, mechanical engineering and electrical engineering.

DETROIT AMONG FOUNDRIES

By A. H. ALLEN
Detroit Editor, The Foundry

HOTTEST construction project in the foundry industry of the Detroit district is that now under way at the foundry of the Pontiac Motor division, General Motors, Pontiac, Mich., where an approximate 50 per cent increase in capacity is being provided for 1941 model production. Plans have all been developed and contracts let. Activity on 1940 models in the foundry drew to a close about May 17, and construction gangs flocked in to make necessary extensions, scheduled for completion June 1.

Five principal improvements are being made to foundry departments. They include a 100-foot extension to the pouring bay; an 80-foot extension to the cupola house, plus an additional lateral expansion to accommodate new cupolas, blowers, charging cranes and the like; a new sand storage space, and a building to house sand drying equipment, similar to that installed for core sand at the Buick foundry, and described in THE FOUNDRY for May.

Prepare for Expansion

Occasion for the important expansion at Pontiac is the fact that a considerable volume of additional casting work will be done there for various General Motors divisions. Cylinder blocks for the Olds 8 and 6 models will be produced at Pontiac, perhaps not in their entirety at first, but probably all the 8-cylinder blocks and a portion of the sixes. Further than this, castings will be produced for the Yellow Truck & Coach division at Pontiac and, more important, housings for the Hydra-matic drive built by the Detroit Transmission division.

It is expected an appreciable increase in production of this automatic transmission will be necessary for 1941 models. Currently about 250 units are being assembled daily in Detroit, and this output is not sufficient to keep abreast of demand. It may be that some form of this transmission will be offered by other General Motors cars than Olds in 1941. Reports are heard that Buick engineers are working on some adaptation of it for their models in prospect for next year.

Based on these reports, and the fact that Chrysler Corp. now is erecting a new plant to produce around 1000 fluid drive assemblies daily for next year's models, it is a good bet that automatic transmissions will be one of the main talking points, if not the principal feature, of the new models which now are under way in production and engineering departments.

Getting back again to the Pontiac foundry expansion, two new 96-inch Whiting cupolas will be installed to supplement capacity of the present four. In regular production probably four will be in operation, two on hard iron, two on soft iron, with two in reserve or being repaired. The new melting units are duplicates of those now in service and are not standard types, but modified according to Pontiac design concepts.

Cupolas Have Deep Wells

Cupolas are designed principally to make available a large quantity of extra-hot iron. Since no receiving ladles are used, the cupolas have deep wells (about 3 feet from slag hole to sand bottom) and tapping temperature is held at around 2850 degrees or somewhat higher. High-pressure blast, or high-blast as it is termed, is used, calling for special blower equipment. Air is not preheated. Expenditure for the cupolas will run about $30,000, with another $30,000 for blowers.

Upping the pour at the Pontiac foundry from around 550 tons per day to possibly 750 tons per day naturally will make serious inroads on the business of foundries formerly supplying this difference. Principal sufferer is Buick and while the loss of this tonnage by the Buick foundry is no small matter, if Buick production mounts in 1941 to the extent executives now are planning, there will still be plenty for the Buick melters to do.

Buick production of 1940 models will come close to 240,000 units when the curtain is rung down. Looking ahead to 1941, a tentative goal of 300,000 cars has been set, or a 25 per cent increase. This increase alone would absorb about one-third of total Olds production, and Buick this year did not supply all of Olds' requirements.

Observers around Detroit, in noting the shift of parts business from one General Motors unit to another, credit Pontiac executives with a "good selling job" to officials of the corporation and of the Olds division. While it is still all in the family, the average person would be surprised at the competition, even bitter at times, which exists between the various divisions of the corporation. It is perhaps a good thing such feelings exist, for in the long run they can only mean better values for the car-buying public, and in turn better profits for stockholders.

Impressed by Exhibition

Several score Detroit foundrymen returned from the annual convention and equipment display, all full of new ideas and convinced that the large volume of exhibition material was the finest ever assembled for inspection by the industry. To many, and especially to the wearers of 50-year honorary service buttons, the remarkable technical progress of the foundry industry, even in the past decade, is attributable in the main to the demands of the automotive industry. Constant attention to reduction of castings costs and improvement of quality and performance, results in only one thing—unceasing improvement in equipment and methods for castings production.

One of the most spectacular of the various exhibits was the huge Beardsley & Piper sandslinger. This large unit, with the operator riding on the head is so flexible and readily controlled that it is possible to follow the contour of any size or shape of mold on the floor.

Searching for some method of control whereby it would be possible to guide the movement of the head quickly and in any desired direction, the designers turned to hydraulics. Engineers in that field assured them

(*Concluded on page* 118)

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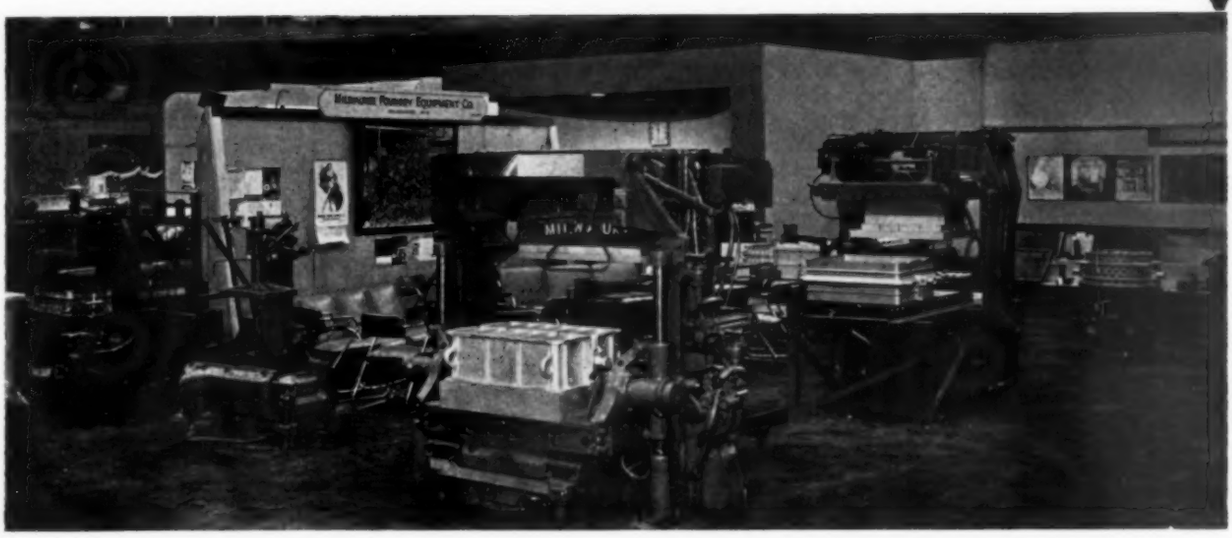

Showing two views of the Milwaukee Foundry Equipment Company exhibit at the Foundry and Allied Industries Show, Chicago, Ill.

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THE ADVENTURES OF BILL

By PAT DWYER

Drawings By RICHEY

WHAT would you say," I asked Bill, "if a nice, civil young fellow wrote you for advice on whether to stick to his present job in the foundry, or try a flyer in another direction, say in the field of journalism or advertising? He is a graduate metallurgist and for the past 2 or 3 years has been working in one of the plants operated by a large corporation. Part of his work is in grimy and dusty locations and most of his work is of a routine character which does not require original thought or action. The work does not present any problem to tax his ingenuity or resource, and does not even call into play half his present stock of knowledge. He has an ambition to break away from established practice and devote all his time to exploring new fields."

"Reminds me," said Bill, "of the book agent who tried to sell a farmer a book which he claimed would make him twice as good a farmer as he was. 'Go away,' said the farmer wearily, 'Go away and pester some one else. What with the govament an' the weather, the bugs an' cut worms an' corn borers and one thing and another I ain't runnin' this here now farm half as well as I know how all ready!'

"I wish," Bill continued, "you had tossed that question into one of the conversational and intellectual pots bubbling merrily and at times violently at the A.F.A. camp meeting last week in Chicago. I know certain lads who earnestly would counsel the young man to stay on the job, work hard and diligently, burn the midnight oil and all that kind of stuff even though the task is highly distasteful. Eventually he would be recognized and rewarded.

"Other men, blunt and forthright, would advise him to quit right now, roll around like a ball on a pool table and depend on luck, chance or opportunity to knock him into a prize pocket. Every man's views are tinged by his own experience. You probably have noticed that men's views change with the marching years. Men who at 20 to 25 are all for storming the palisades and capturing the block house by fierce hand to hand fighting, favor a different kind of attack after 50. They may be as eager as ever to attain their objective, but they prefer to crouch behind a big gun several miles away. From this comparatively safe retreat they can knock —well—ah—they can knock the stuffing out of the fort and the blinkin' inhabitants thereof. As a more or less interested spectator on the side lines you probably have noted that the men who start the wars and the men who keep them going most enthusiastically are well over draft age."

"Seems to me," I said, "You have been stuffing yourself with newspaper war news and reveling in the cinema presentation of *Drums Along the Mohawk* and *Northwest Passage*. What has all that long range gun and old time block house reference to do with the question of a young man seeking a career?"

"Well," said Bill, "I'll tell you As Confucius might have said 'All that war talk is just a slip of the tong.' Get it? Slip of the tong? Purty neat, if you ask me. Just a flash of inspiration as you might say—"

Farmer in the dell says NO

"Old stuff," I told him. "That play on tong and tongue has been going the round of the newspapers and the alleged funny papers since away before the days of Happy Hooligan and the Yellow Kid. The vaudeville fellows picked it up later and I should not be surprised to find one of our brilliant radio artists dredging it up out of the depths one of these days and springing it as his own original, dyed in the wool, blown in the bottle composition. However, as I said before—you probably were not listening as usual—what are we going to do about this pilgrim seeking the light, this young man who thinks perhaps he might fly to the top of the tree faster if he took up journalism or advertising?"

"Ease up on the accelerator my dear young racer and touch your toe to the brake pedal. Where do you get that we stuff? I have to make enough decisions of my own without hopping over the fence to investigate every problem that rolls down the broad highway. That is the result of living a soft, easy life. You can't even make up your mind any more. A far cry from the old pioneering days when every man stood upon his own two feet and in the picturesque language of the period 'Aimed to plant his own prey.'

"That point was brought to my attention several times at the Chicago meeting when I ran into members of the old guard, former members of the Associated Foundry Foremen, an association organized by Henry Hansen, one time editor of THE FOUNDRY, an association which flourished for several years after the turn of the century. Only a few of the old boys left. They like to discuss the old days and the old conditions when the foreman was the best man in the shop and therefore ruled it as an autocrat. He was the boss. If you were hired, you were hired. If you were fired, you were fired and that was the end of the argument.

"For example there was Rudy

(*Continued on page* 90)

AMAZING Core-Room Savings with COLEMAN TOWER OVENS

FASTER BAKING is obtained by rapid air circulation under complete control. Large and small cores can be baked together safely. Save 50% in baking time.

CORE BINDER SAVED . . . . Uniform temperature and positive circulation throughout oven results in 50% core oil saving.

FLOOR SPACE SAVED . . . Coleman Tower Ovens save approximately 75% in floor space.

SAVES UP TO 50% IN FUEL, and you can use whatever fuel is most economically available in your vicinity.

PRODUCTION INCREASED . . . Individual production is increased as much as 50% due to elimination of walking, waiting for racks, changing of racks, improper turnover of core plates, driers, etc.

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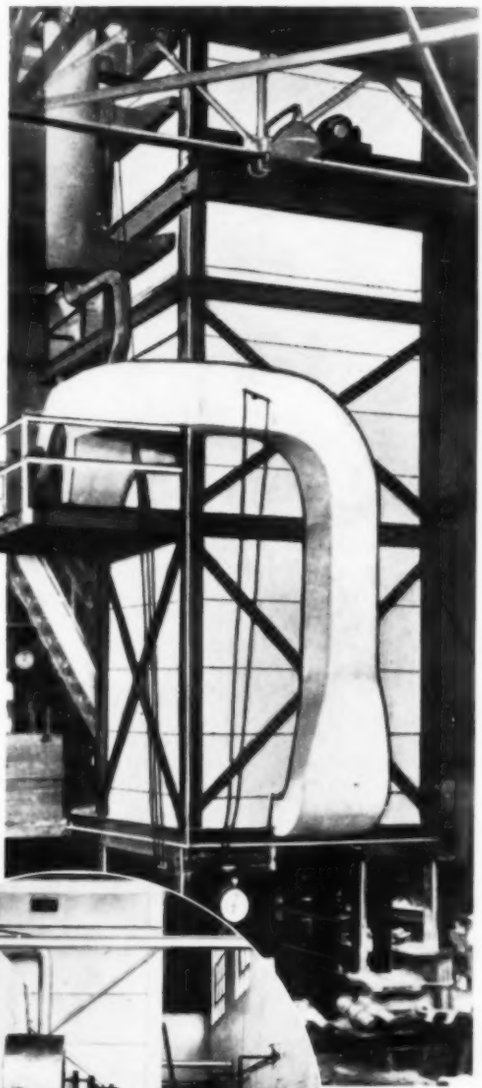
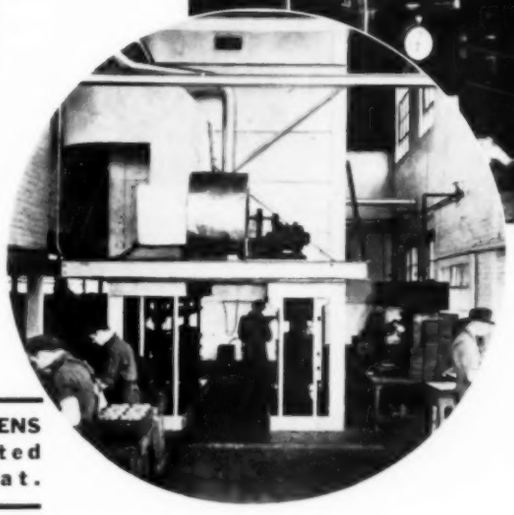


Coleman Tower Oven at Key Company, East St. Louis, Ill.



Coleman Tower Oven at Decatur Casting Co., Decatur, Ind.

COLEMAN TOWER OVENS are fully protected by U.S. Letters Pat.

Leading foundries are "banking" almost unbelievable savings since the installation of Coleman Tower Ovens. If you have not already investigated the possibility of making tremendous savings in your core department, there is no better time than now to ask our engineers for a survey of your operating conditions. This service is entirely without obligation on your part—so it costs you nothing to be shown.

Coleman Ovens, for over thirty-five years, have been noted for dependable production of uniformly good cores with less fuel and binder.

•

COLEMAN OVENS

Also built in the following types and for any fuel.

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- ROLLING DRAWER.
- TRANSRACK.
- CAR.
- HORIZONTAL CONVEYOR.

Write for Complete Catalogs

THE FOUNDRY EQUIPMENT CO.
BUILDERS OF COLEMAN AND SWARTWOUT OVENS
CONTRACTING ENGINEERS AND MANUFACTURERS
CLEVELAND, OHIO

COLEMAN
CORE AND MOLD OVENS

(*Continued from page* 88)

Wegelin, foreman for many years at Joubert & Goslin's in Birmingham, Ala. He usually was credited with knowing more about the production of sugar mill castings than any other foundryman north or south. He did not need pyrometers, testing apparatus, gages or any of the modern safe guards. All he needed was his eyes and his own two hands. According to tradition he did not need a scale to weigh the cupola charges. He showed the colored helpers a few times how much stuff to throw in and had no further trouble. One look at a pattern was all he needed to decide on the weight of the casting and the amount of metal required in the ladle.

"The shop was a regular port of call for the hobo molders making the semiannual migration north and south in the spring and fall. Most of these men were qualified mechanics, but almost without exception they were addicted to the use, or perhaps it would be more accurate to say the abuse of spirituous and malt liquors. You know the stuff that stingeth like an adder and does not do one a bit of good on the following day.

"Puss Malarkey automatically and mechanically put up a job one day, but overlooked the very essential feature of placing a chaplet over the core. I don't know where or how he got the name, but assume it was the happy inspiration of a local wit where Puss served his time. Never knew a shop without at least one lad who had the most devilish ingenuity in spotting a man's weak point and in coining a nick name to suit. In this instance Puss was used in a slightly vulgar sense, based on the fact that the owner's puss bore a fancied resemblance to a piece of coke from the cupola dump. Kind of lumpy and rough, rusty color and usually moist under the overflow from a pair of leaky eyes. The gang was almost convulsed one day when a colored helper confided to a second colored helper who broadcast the good word all over the shop that 'Mistah Puss should ought to call in a plumma an' have new washas put on the leakin' peepahs!'

"The peepers almost popped out next morning when Rudy called Puss down to the cleaning room to show him a casting with the core cutting through the top. Rudy told him he had hired him under the impression he was a molder. He realized he had made a mistake. If Puss was a molder, then he, Rudy, was little Dan Cupid with pink wings and a guitar. 'Go to the office' he said, 'and get your time and then fly away. The farther and faster you go the better I shall be pleased and if I never see you again it will be too soon.'

"Deeply incensed, humiliated, chagrined and mortified by this—in his estimation—totally unwarranted attack on his lack of capability, Puss vigorously defended himself by the oblique method of deprecating his adversary's skill, knowledge, nationality, standing in the community, personal appearance, habits and many other features which an unbiased listener would consider as decidedly uncomplimentary. A legally minded gent probably would consider them defamatory, libelous and containing sufficient grounds on which to base an action involving heavy damages, half for the party of the first part and half for the bird who hatched the idea.

"In an inspired and heated peroration Puss called on high heaven to witness that in a long and honorable career he had worked under the big hook in shops where Rudy would not be considered sufficiently skilled to clay wash the gaggers used by the high class molders. He (Puss) would not work in the present joint another minute. He would not stay even if Rudy went down on his bended knees and offered to raise his pay 2 bits per day. He could get a job any place. In the remote event that no foundry job was available, he would equip himself with a steel bill and join the hens and chickens in picking up an honest living in preference to coming back to work in this dump.

"Every day according to long established custom Rudy planted himself on a nail keg where he could watch the first blast blowing through the cupola tap hole. During this period also he encouraged any of his men with a grievance to come forward and tell him where the shoe was pinching. About a week after the events related in a preceding chapter Puss came into the shop and shuffled up to where Rudy sat on his nail keg throne. Sober and repentant he greeted the gaffer politely and courteously 'Hi-ya Mr. Wegelin. How's chances fer a job?'

"'So,' says Rudy. 'You're back again hey? Did you und de jickens fall ouit?'"

"The whole thing," I said, "sounds to me like one of the stories from the extensive and interesting repertoire of John Hill of Cincinnati. However, it does not answer my question. What am I going to tell the young man who is leaning on me for information?"

"A fine broken reed you turn out to be. Without attempting to set up as an oracle I should tell him that his request for a word or two

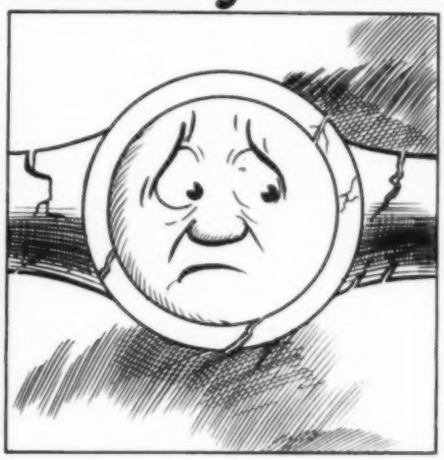
(*Concluded on page* 138)

Inta-du-sing new type qblow. Many exclusive features. The only one in captivity supported on three legs

DIXIE BOND

makes any foundryman's job easier!

You need not have sand baked hard in flasks and difficult shake out unless you **WANT** *it!*



You need not have the risk of cracked castings from high hot strength unless you **WISH** *it!*

You need not have lumpy sand at the shake out unless you **LIKE** *it and* **INSIST** *on having it!*

AS COMPARED TO BENTONITE

DIXIE BOND ■

gives higher green strength, higher permeability, higher sintering point, MUCH higher flowability and

MODERATE DRY STRENGTH . . . MODERATE HOT STRENGTH

HERE ARE THE FACTS:	DIXIE BOND	75% DIXIE 25% BENTONITE	50% DIXIE 50% BENTONITE	25% DIXIE 75% BENTONITE	BENTONITE
Per cent bond used	4%	5%	5%	5%	5%
Tempering water	2.5%	2.5%	2.5%	2.5%	2.5%
Permeability	178	178	178	169	167
Green comp. strength	9.9	16.4	14.2	11.6	9.9
Dry comp. strength	47	44	49	54	83
Hot strength—1000° F.	35	50	60	110	195
2000° F.	25	100	190	230	490
Retained strength after heating to 800° F. and cooling	20	26	40	45	55

Retained strength indicates the amount of lumps at shake out. Note that bentonite is continuing to progress to still higher strengths at 2000° F. while Dixie shows a desirable collapsibility.

USE STRAIGHT DIXIE OR COMBINATIONS AS ABOVE TO GIVE THE DRY STRENGTH YOU NEED AND NOT SOME UNREASONABLE DRY STRENGTH THAT CAUSES ONLY TROUBLE. MAY WE SEND YOU A SAMPLE?

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ADVERTISING PAGES REMOVED

GREAT CONVENTION

Shows *Industry Confident* of the Future

(*Continued from page* 37)

to the foundry industry. This challenge can be met in part if foundrymen will accept their responsibility of membership and thus promote the beneficial exchange of ideas.

Mr. Washburn stressed the importance of encouraging "fresh thinking" young men to take their proper place in the industry. He urged that they be given an opportunity to test their ideas before they get into the rut of orthodox experience and thinking. Give them this chance, he concluded, "And use the A.F.A. as a clearing house for ideas; then we can face the future with confidence."

Award Gold Medals

Following President Washburn's address, the four gold medal awards, voted by the board of awards of the A.F.A., were presented by past presidents of the association. For outstanding contributions to the foundry industry, N. K. B. Patch, Lumen Bearing Co., Buffalo, was presented the John A. Penton gold medal by James L. Wick Jr., Falcon Bronze Co., Youngstown, O., and past president of the A.F.A. In recognition of his achievements in cupola melting, Frederick K. Vial, director and vice president, Griffin Wheel Co., Chicago, was awarded the J. H. Whiting gold medal, the presentation being made by H. Bornstein, John Deere & Co., Moline, Ill. For distinguished service in the advancement of the steel castings industry, Fred A. Melmoth, vice president and works manager, Detroit Steel Castings Co., Detroit, received the Joseph S. Seaman gold medal, presented by Marshall Post, Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa. For his signal contributions to the knowledge of sand control, Harry W. Dietert, president, Harry W. Dietert Co., Detroit, was honored with the W. H. McFadden gold medal, which also was presented by Hyman Bornstein.

The feature of the annual meeting was the presentation of the third in a series of lectures sponsored by the board of awards to stimulate discussion of nontechnical problems of general interest. The 1940 address was presented by Charles E. Wilson, executive vice president, General Motors Corp., Detroit, who urged industry to make determined efforts to restore hope, ambition, and morale among young men seeking positions, to take new interest in curricula in schools and colleges to the end that young people will be better prepared for positions in industry, and to make further special attempts to provide places for young men in plants.

Mr. Wilson's address was keyed to the theme of the annual meeting which was focused on opportunities for youth, and industry's responsibilities in providing therefore. Recalling his own personal experiences as a young man seeking employment, he emphasized the changed conditions which confront young people today and the fact that they are bearing more than their share of current unemployment. He pointed out that 30 or 40 years ago industry and working activities were not on such a formal and large scale, and it was much easier for a boy or young man to see what men did when they worked, and, even before they were old enough themselves to work, to begin to understand how to do things.

Mr. Wilson observed that parents today are too inclined to conclude that a formal education is a guarantee for their offspring's economic security and place in society. Figures attest the widespread increase in education over the past 20 years. For example, in 1920 there were 211,266 high school graduates and in 1938 there were 1,075,000. In 1920 there were 48,622 college graduates; in 1938 there were 147,500. Despite this emphasis on education, unemployment among young people is serious, leading to the conclusion that book learning alone without the knowledge of how or the willingness to do some of the simpler jobs, ultimately proves a handicap.

Mr. Wilson noted that industry in many cases has recognized the problems of youth seeking employment and he commended the efforts being made to solve them. Apprentice training programs, such as the A.F.A. has sponsored for many years, are a definite step toward alleviating the distress of the idle youth. As a token of appreciation, President Washburn presented Mr. Wilson at the conclusion of his address with a cast bronze horse executed by a noted Chicago sculptress.

Disseminate Information

An interesting program featured the annual dinner of engineering school and plant instructors on Monday evening, with Frederick G. Sefing, International Nickel Co., New York as chairman, and Carl H. Casberg, department of mechanical engineering, University of Illinois, Urbana, Ill., as co-chairman. In opening the discussion on ways and means of disseminating information on cast materials to students, C. E. Westover, Burnside Steel Foundry Co., Chicago, and chairman of the committee which co-operated with the Museum of Science and Industry in establishing the operating foundry exhibit, presented certain facts and figures which indicated the magnitude and importance of those plants engaged in the manufacture of castings. He then discussed the operating exhibit at the Museum and explained that it is designed to tell the general public that the foundries today are a part of an up-to-date and progressive industry.

Four representatives of the Chicago public schools then present-

(*Continued on page* 95)

(*Continued from page* 92)

ed an interesting round table, the first, a vocational guidance director, explained the features of efforts in that direction; the second, a foundry instructor, explained the work of the instruction corps as a part of the vocational guidance efforts. The third, a student who had graduated 2 years ago told of the wide advantage which had been provided through the work he had taken in foundry practice. The fourth, a student in foundry practice, told why he was taking foundry work, and indicated his hopes were the same as those which already had been realized by the graduate student. This was followed by a further round table discussion led by Dean S. C. Hollister, Cornell university, Ithaca, N. Y., and Dean C. J. Freund, Detroit university, Detroit.

Enjoy Social Features

A large crowd of convention visitors attended the stag smoker held in the ballroom of the Palmer House on Tuesday evening, under the sponsorship of a committee of the Chicago chapter. An entertainment program and refreshment were features of the program.

The annual dinner held Thursday evening in the ballroom of the Palmer House, set a new attendance record, with approximately 900 men and women present to participate in the program arranged by the committee of the Chicago chapter. Following dinner President Washburn introduced the four A.F.A. medalists for 1940. An entertainment program, which included a number of exceptional acts and a dance, followed.

The convention feature which probably attracted the greatest interest was the registration of old time foundrymen under the direction of an A.F.A. committee headed by E. W. Beach, engineering executive, and W. J. Barclay, personnel director, Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich. A booth was maintained at the International Amphitheatre and by the close of the convention week, registration had reached a point where the total years of service was in the neighborhood of 30,000. Gold buttons were given for 25 and 50 years' service records. Further information on the results of the old timers' registration will be presented in a forthcoming issue of THE FOUNDRY.

Approximately 300 foundrymen visited the plant of the Wisconsin Steel division, International Harvester Co., South Chicago, Ill., on Monday afternoon to gain an insight into the production of pig iron, openhearth steel, and rolled steel. The tour began at the coke plant where the visitors saw an oven pulled and quenched, and then proceeded to the blast furnaces during a cast. The groups watched the tapping of a 150-ton openhearth furnace, and later saw steel ingots rolled into blooms, and into merchant sheets. On the return trip from the Wisconsin company a stop was made at the Museum of Science and Industry to see a special showing of the foundry department. During the week, many convention visitors participated in the excellent plant visitation program arranged by a committee of the Chicago chapter.

NONFERROUS PRACTICE

Problems Are Studied

UNDER the joint chairmanship of Wm. J. Laird, Westinghouse Electric & Mfg. Co., East Pittsburgh, and R. W. Parsons, Ohio Brass Co., Mansfield, O., three papers were presented at the first nonferrous session on Tuesday. The first, "Melting of Copper Base Alloys To Retain Physical Properties," was presented by Wm. B. George, R. Lavin & Sons, Chicago and the second, "Improvements in Gas Melting Furnaces in the Nonferrous Foundry," by E. W. Williams, Equitable Gas Co., Pittsburgh. The third, "Crucible Melting with Modern Gas Burners", written by Fred L. Wolf, Ohio Brass Co., Mansfield, O., was presented by R. W. Parsons.

According to Mr. George, the outstanding problem of the nonferrous foundryman is to meet physical property requirements. While many foundries have mastered general problems, others search in the dark for solutions to their difficulties. To that class the author especially directed his paper. Although it is impossible to lay down a universal cure-all for the difficulties encountered in meeting physical specifications, he outlined the practice used in the majority of foundries. For all practical purposes it may be said that when a solid metal changes to a liquid, gases are given up and are reabsorbed during superheating. In this relatively gas free state, just after liquidation, a silver sheen may be observed on the surface of the bath when the covering is pulled back in a reducing atmosphere. All metals and their alloys exhibit this phenomenon. The best physical properties are found in metal that shows this sheen. The speaker discussed general melting practice, fuel consumption, melting time, deoxidizers, and various test results.

E. W. Williams, outlined what he believes is the ideal melting furnace for a nonferrous foundry. He divided furnaces into two classes, crucible and open flame. According to the author the ideal furnace will deliver metal of uniform composition and analysis at uniform temperature heat after heat, will last indefinitely and will operate at minimum cost.

Operating results on an insulated, stationary, No. 60 crucible furnace using natural gas and melting a variety of nonferrous alloys were described in the third paper prepared by Mr. Wolf. Modern burner equipment insures considerable saving in gas, with greater melting speed and increased crucible life. A truly neutral atmosphere is obtained without any special skill on the part of the operator. Flame temperature is higher and the service is severe on refractories even those of super duty type.

Second nonferrous foundry practice session held Tuesday afternoon was exceptionally well attended, and was under the chairmanship of Harold J. Roast, Canadian Bronze Co. Ltd., Montreal, with William Romanoff, H. Kramer & Co., Chicago, as co-chairman. A. K. Higgins, Allis-Chalmers Mfg. Co., Milwaukee, presented a paper on pouring nonferrous castings through the risers in which he related his experiences with that method as applied to bushings, pump impellers and pump casings ranging in weight from 300 to 3500 pounds. He found that top pouring through the risers more applicable to the 80-10-10, 85-5-5-5, and 75-10-15 alloys than to aluminum or manganese bronze. Also that lower temperatures can be employed with better resulting physical properties, and less metal is required for gates and risers.

In response to a question from the floor, Mr. Higgins said that with top pouring the relation of riser weight to casting weight was from 15 to 20 per cent, a considerable reduction as compared to ordinary methods of gating. He also said that with manganese bronze the weight of risers also was decreased, and that the same applied to high

(*Continued on page* 98)

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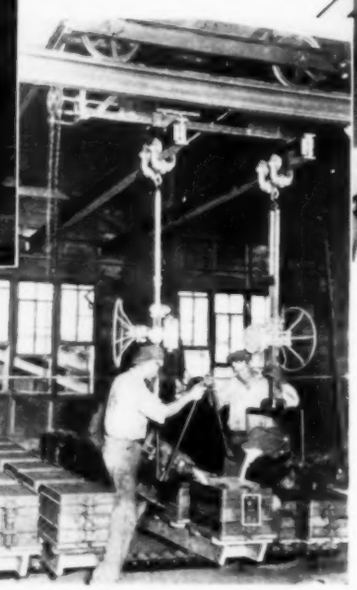

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Modern Richardson Monorail Type Charger Bucket Approaching Cupola

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(*Continued from page* 95)

nickel alloys containing say 20 per cent. However, his experience with manganese bronze was confined to small castings. Mr. Roast mentioned that top pouring gave good results with high shrinkage alloys such as silicon bronze.

G. K. Eggleston, Detroit Lubricator Co., Detroit, gave a brief resume of the "Tentative Recommended Practices for Sand Cast Foundry Bronzes, Red and Semired Brasses" sponsored by the nonferrous division of the A.F.A. In the discussion which followed Sam Tour, Lucius Pitkin Inc., New York, questioned a number of points relative to the limiting amounts of such elements as silicon, sulphur, aluminum and antimony, stating that he believed them to be too high. He also said that he believed specifications given should conform to those of the American Society for Testing Materials. Others commenting on the report included H. M. St. John, Crane Co., Chicago; C. V. Nass, Fairbanks Morse Co., Beloit, Wis.; R. W. Parsons, William Romanoff, and W. J. Laird.

Closing session of the meeting was the annual business meeting of the nonferrous division. Chairman Roast read the minutes of the last meeting, and then called for summarized reports of the various standing committees. He asked Sam Tour, chairman of the nominating committee to present his report which named the following officers for two years: Chairman, W. J. Laird, and vice chairman, W. H. Romanoff; members of the advisory board for 4 years: H. B. Gardner, National Bureau of Standards, Washington, E. F. Hess, Ohio Injector Co., Wadsworth, O., and J. W. Kelin, Federated Metals division, American Smelting & Refining Co., St. Louis. No further nominations being received, the nominees mentioned were elected unanimously.

Nearly 150 attended the roundtable luncheon of the nonferrous division which was held at the Stock Yard inn on Wednesday noon with C. O. Thieme, H. Kramer & Co., Chicago, presiding. Subject of discussion following the luncheon was metal covers, fluxes, deoxidizer and degasifier practice. Basis for the discussion was a summary of replies received to a questionnaire sent to a large number of nonferrous foundries. These indicated a wide variance in the practice pursued. Types of alloys included silicon bronzes, copper and high copper alloys, manganese bronze, yellow brass, aluminum bronze, high nickel alloys, regular foundry brasses and bronzes, and alumium alloys.

Approximately 75 attended the second annual dinner of the nonferrous division which was held Wednesday night in the Palmer House, with Harold J. Roast as toastmaster. Several songs were presented by Miss Constance Merrell and Wallace Sandberg. Principal speaker was William S. Devereaux, agent in charge, Federal Bureau of Investigation, Chicago, who presented an extremely interesting talk on "Crime and the Citizen" in which he described the work of his bureau.

Consider Properties of GRAY CAST IRON

THREE papers were presented at the gray iron session, Thursday afternoon, presided over by G. P. Phillips, International Harvester Co., Chicago, and W. H. Spencer, Wilkening Mfg. Co., Philadelphia. "Effects of Sulphur on Properties of Electric Furnace Cast Iron" was described by Fulton Holtby and R. L. Dowdell, University of Minnesota, Minneapolis. "Effect of Varying the Silicon Content of Cast Iron" was discussed by Frederick G. Sefing, International Nickel Co., New York, while W. Levi, Lynchburg Foundry Co., Radford, Va., presented a paper entitled "Desulphurization of Cast Iron from Practical Operating Standpoint."

The first paper recorded results of an investigation of the effects of sulphur on the various properties of electric furnace cast iron. Data included observations of the behavior of metal prior to pouring. Forty casts were made under controlled conditions in the form of various type test bars. These were tested for transverse strenght, deflection, tensile strength, fluidity, machinability, hardness, contraction, depth of chill, chemical analysis and microstructure.

The authors conclude that at about 0.18 per cent sulphur there is a transition point in the iron properties. Up to the point increased sulphur lowers transverse and tensile strength and hardness, and increases deflection. At percentages above the point, the reverse is true. According to the authors an increase in sulphur will decrease the manganese. Fluidity of the metal decreases rapidly at about 0.18 per cent sulphur. Fluidity remains the same above and below that figure provided the manganese is held constant. Chill depth is not affected by sulphur provided manganese remains constant. Up to 0.14 per cent sulphur machinability decreases. Between 0.14 and 0.18 per cent it increases and again decreases above the latter figure.

Carbon Content Important

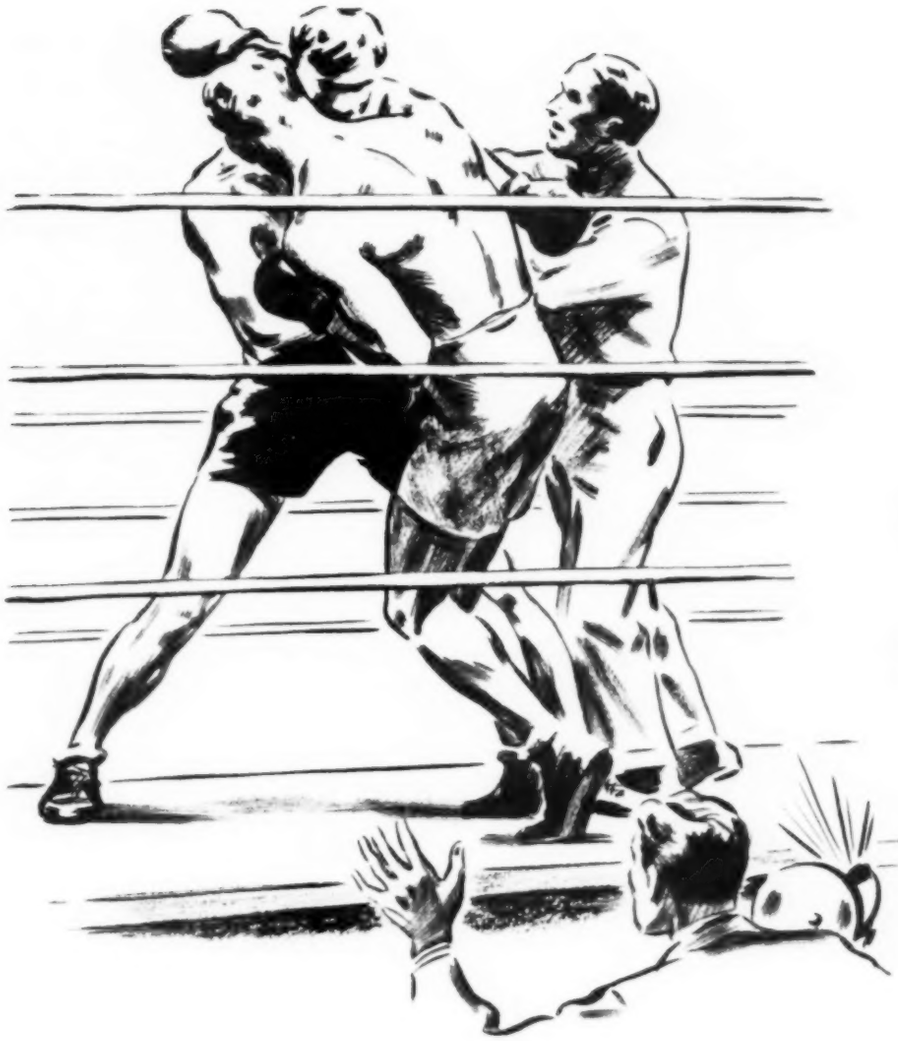
As a result of an extensive series of tests described in text and tabular form, Mr. Sefing presented the following conclusions: There exists an optimum silicon content for each carbon level to obtain the minimum section sensitivity indicated by hardness values of the same order between light and heavy sections. The section sensitivity generally is in a higher hardness range for the low silicon irons and in a lower hardness range for the high silicon irons. Tensile strength decreases with increase in silicon in the 3.50 per cent total carbon iron. It changes its response to increasing silicon as the total carbon falls to 2.75 per cent. Tensile strength does not change with increasing at 3.35 and 3.00 per cent total carbon and shows an increase with increasing silicon at 2.75 per cent total carbon.

Five typical case histories were presented by Mr. Levi showing the application of equipment and methods employed for removing sulphur from iron melted in a battery of six cupolas and with charges made up of scrap from 80 to 100 per cent. Fused soda ash was the active agent employed in all cases.

C. H. Lorig, Battelle Memorial institute, Columbus, O., presented a paper prepared in collaboration with V. H. Schnee, also of the institute, on the damping capacity, endurance, electrical and thermal conductivities of some gray irons, at a gray iron session held Friday morning. Chairman of the meeting was H. Bornstein, Deere & Co., Moline, Ill., who was assisted by Co-chairman A. L. Boegehold, General Motors Research Laboratories, Detroit. Results obtained on gray irons containing copper indicate that element may benefit damping capacity at working stress, as copper increases up to 3 per cent a slight decrease occurs in endurance ratio, and that copper has little effect on thermal and electrical conductivities.

In the discussion E. K. Smith, Electro Metallurgical Co., Detroit, asked what was the limit of solid solubility of copper in gray iron

(*Continued on page* 100)



"They kept swinging AFTER THE BELL"

"The bell has sounded," says your radio ringside reporter, "but they're still swinging." . . Visitors continued to stop at our booth after the Chicago convention had officially closed. They kept coming and talking with us even after the air went off and the lights went out. Thus ended the first round.

What about the next round? Ordinarily, the bell no sooner rings than both contestants "huddle" with seconds and handlers. How lick this angle? How combat that? And then bong! again. . . The next round has begun for you. It has to be fought on your own ground, literally—in your own plant. You are no doubt reviewing your problems right now in the light of what you saw, heard and learned at Chicago. These problems are, if anything, even more acute today than a month ago. Why not tackle them without delay while they—and you—are still fresh, and dispose of them to help the "black side" of your ledger?

A SPO representative will be pleased to talk over your situation with you with a view to product improvement and cost reduction.

SPO has been privileged to assist in many such situations. We'll be glad to resume where we left off on May 10. *Keep swinging, Mr. Foundryman.*

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ADVERTISING PAGES REMOVED

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with reference to silicon and carbon. Mr. Lorig said that with a high carbon iron, copper tended to separate at about 4.5 per cent, but with high silicon iron that did not occur with copper up to 20 per cent. Inquiry was made on the effect of copper relative to wear resistance, and many opinions were given. Some claimed that copper reduced wear resistance while others had an opposite opinion. Discussion indicated that the most important factor was type of structure, and addition of copper or any other alloy which resulted in improvement of structure or establishment of a preferred wear resisting structure, would increase wear resistance.

Ferrite Related to Wear

Mr. Smith presented a paper on observations on microstructure, composition, hardness and wear of some cast iron cylinder bores in which he pointed out that there appeared to be a relation between the amount of ferrite present in the structure, and the wear; the more ferrite present, the greater the wear. Paul S. Lane, Muskegon Piston Ring Co., Muskegon, Mich., in discussing the paper, said his work agreed with results obtained by Mr. Smith, and that by control of cooling rates, trouble from ferritic structures could be eliminated. He also ventured the opinion that low wear resistance may not be due so much to the presence of ferrite itself as it is to the accompanying fine graphite condition.

D. F. Rundle, Centrifugal Fusing Co., Lansing, Mich. inquired about the effect of alloys on wear resistance, and Mr. Smith said that in the specimens examined, those containing small amounts showed the best resistance. While it was possible to obtain good wear resistance in unalloyed iron, it was easier to obtain a preferred wear resisting structure by use of small amounts of alloys. In the discussion, attention also was called to the importance of obtaining the maximum combined wear of both piston ring and cylinder bore, and not increased wear resistance of one in preference to the other.

Final paper at the session was presented by Bernard Fried, Ohio State university, Columbus, O. It described a device for measuring the tendency of some cast irons to seize under sliding friction, and some results obtained, and was prepared in collaboration with A. H. Dierker and H. H. Dawson, also of the university. The device, based on a shaper, obtains results on seizure under load with boundary lubrication. As one result obtained, Mr. Fried mentioned that gray iron should not contain large amounts of either ferrite or carbide structure if it was desired to hold seizure at a minimum.

Final session on gray iron was held Friday afternoon under the chairmanship of S. C. Massari, Association of Manufacturers of Chilled Car Wheels, Chicago, and Co-chairman Fred J. Walls, International Nickel Co., Detroit, with nearly 200 in attendance. First paper was presented by Alfred Boyles, Battelle Memorial institute, Columbus, and described an investigation of the pearlite interval in gray cast iron. Data obtained indicate that ferrite, austenite and graphite exist within a range of 1450 to 1500 degrees Fahr. for the irons studied. Also that the rate of formation of both pearlite and ferrite was accelerated at subcritical temperatures. Under identical heat treatment conditions iron with fine flake graphite showed more ferrite than one with large graphite flakes. Initial heating had an effect on the rate of ferrite formation, and in small castings examined by quenching at various cooling stages in the mold, ferrite began to form along the graphite flakes prior to formation of pearlite and continued to develop during the transformation period. No additional ferrite appeared after transformation was complete. It was found that silicon not only promotes graphitization but also provides a mechanism for formation of free ferrite.

Second paper was presented by Dr. Richard Schneidewind, University of Michigan, Ann Arbor, Mich. It was prepared in collaboration with C. D'Amico, also of the university, and dealt with the formation of various types of graphite patterns in gray cast iron. Final paper of the session was by B. P. Mulcahy, Citizens Gas & Coke Utility, Indianapolis, and outlined in detail a report of a by-product coke specification proposal for the American Society for Testing Materials.

A large group attended the luncheon meeting of the gray iron division of the A.F.A. which was held Thursday noon in the Stock Yards inn. G. P. Phillips, chairman of the division, presided.

Discuss Malleable MOLDING AND CONTROL

FIRST session on malleable iron on Tuesday morning, May 7, afforded three papers. C. C. Lawson, superintendent, Wagner Malleable Iron Co., Decatur, Ill., officiated as chairman, and D. P. Forbes, president, Gunite Foundries Corp., Rockford, Ill., as co-chairman.

Usual practice in malleable foundries producing castings for the automotive industry is to make large quantities of identical castings on each type of molding machine equipment. Saginaw Malleable Iron division, General Motors Corp., Saginaw, Mich., has found it advantageous to deviate from this practice by grouping various assemblies of parts which go on the same car. For example, the carrier housing, differential case and a spring hanger lend themselves to production as a composite assembly in one mold. In that manner as many of 14 units are made in a single mold.

How composite molding is engineered and carried out in the Saginaw plant was described by S. W. Healy, assistant to the works manager. He pointed out that numerous economies are achieved in scrap control, gating, foundry operations and production control. An added advantage is that of permitting a workman the opportunity of remaining on a given job for a longer period, which from an employe relation standpoint is most desirable. Development in size of equipments has been limited in scope to the size of molds which can be handled manually. A distinct advantage, Mr. Healy said, has been found in material handling through the continuity gained by annealing and processing in closer ratio to the assembly of parts as used by customers.

A sand control program in a malleable foundry was described by D. F. Sawtelle, metallurgist, Malleable Iron Fittings Co., Branford, Conn. His paper reported progress made after many futile attempts to change the old customs of a foundry using natural bonded molding sands. This was accomplished after drawing a true picture of existing sand conditions as plainly shown by sand testing.

By drawing up specifications for its sands, Mr. Sawtelle declared, the company was able to purchase sands which have a much superior grain distribution than those formerly used. It has been possible to obtain

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all the benefits of a higher permeability, a higher green compression strength, and a lower moisture content without sacrificing casting finish.

An unusual structure in malleable iron, namely, what is termed an inverse chill fracture — the outside shell being black and the core white —was discussed and an explanation advanced by Prof. Enrique Touceda, consulting engineer, Malleable Founders' society, Albany, N. Y. Incidentally, he regarded the terminology "inverse chill" as a misnomer—it has come into use because it is the opposite of the structure obtained when gray iron is cast against a chill.

Some samples of inverse chill malleable were submitted to Prof. Touceda for examination. Inspection indicated in all cases that the cores were unsound. Some specimens showed segregations, others did not, thus segregation could not be accepted as an explanation for the condition. No light could be thrown on the matter by comparison with the structure of gray iron.

Therefore, Prof. Touceda was forced to conclude that the peculiar structure was a matter of free cementite and pearlite which prevented the core from malleablizing. The trouble, he felt, was caused by the porous condition. This porosity probably was not caused by gas conditions, but probably by bleeding of the mold.

Two papers were presented at the second malleable session. Chairman of this meeting was R. J. Anderson, superintendent, Belle City Malleable Iron Co., Racine, Wis., and D. I. Dobson, metallurgist, General Malleable Corp., Waukesha, Wis., was co-chairman.

Effect of manganese on second stage graphitization was the subject of one paper by D. P. Forbes, P. A. Paulson and G. K. Minert, Gunite Foundries Corp., Rockford, Ill., and presented by the latter. Purpose of this investigation was to show that manganese serves as a graphitization retardant and carbide stabilizer. Samples of malleable containing 0.45, 0.91 and 1.28 per cent manganese, respectively, were studied and all were annealed at 1300 degrees Fahr. Results indicated that over 1.00 per cent of this element definitely retards graphitization. That influence is beneficial, Mr. Minert explained, because it prevents minor variations in commercial malleablizing conditions from exerting an influence on physical properties obtained.

Discussion of the paper reflected rather general agreement with the authors' contention, although few malleable foundries produce iron containing over the usual commercial contents of manganese. R. J. Cowan, metallurgical engineer, Surface Combustion Corp., Toledo, O., however, raised a question as to why a temperature of 1300 degrees Fahr. was used as the annealing temperature of all three analyses. He pointed out that since manganese changes the critical point of the iron, it might have been well to determine the critical point of each analysis and to anneal each at this temperature. Then, he said, the results obtained for the three irons might have been more nearly comparable. Mr. Minert explained that the 1300 degree temperature had been used in the investigation because this is the temperature employed in commercial spheroidization.

Carl F. Joseph, metallurgist, Saginaw Malleable Iron division, General Motors Corp., Saginaw, Mich., stated that in his experience high manganese is not used in malleable because this element adversely affects machinability, an important factor in automotive malleable iron.

Results obtained by subjecting pearlitic malleable iron used for commercial camshafts to an austempering treatment was shown micrographically in a paper contributed by Mr. Cowan. He pointed out that by carefully regulating the temperature of the quenching bath and the time of immersion, it is possible to control the hardness desired. Pearlitic malleables thus treated were shown to possess superior wear-resisting characteristics. A hardened structure may be confined to the surface areas of a heavy section while the remainder of the piece will receive a heat treatment that will have a toughening effect.

Considerable difference of opinion was expressed in discussion of Mr. Cowan's paper as to the desirability of using the austempering treatment for malleable iron. Chief difficulty seemed to be the size and cost of the equipment required, because of the necessity of using the lead or salt bath quench, and because of the longer time involved in the treatment. Mr. Cowan pointed out that this was a continuous process and eliminates the heating of cold material for the customary draw.

A wide range of features connected with the production of malleable iron castings was covered in the agenda presented to a luncheon group Wednesday presided over jointly by A. M. Fulton, Northern Malleable Iron Co., St. Paul, Minn., and P. C. DeBruyne, Moline Malleable Iron Co., St. Charles, Ill. Discussion began with the proposition whether it is penny wise or pound foolish to hold a sand bottom in a furnace for more than 10 or 12 heats, and ended with questions on who is responsible for methods of checking internal defects, and how much thought is given to chills, strips, beads, gates, etc., before quoting a price on castings. Other items included snap flasks versus tight flasks; spectroscope and application; synthetic and natural sand; chill coating; cleaning methods and equipment; core mixtures; dust collection; jackets, pattern plates; scrap losses and gating methods.

STUDY STEEL CASTING

Production Technique

APPLICATION of external chills to various types of steel castings with a view of controlling metal solidification in certain areas formed the subject of a paper presented at the steel castings session on Thursday morning, May 9, by W. F. McKee, Key Co., East St. Louis, Ill. The session, under the joint chairmanship of T. N. Armstrong, International Nickel Co., New York, and H. M. Rishel, American Steel Foundries, Granite City, Ill., also received a report of the committee on methods of producing steel for castings.

Mr. McKee presented the results of experiments conducted in the plant with which he is connected on the proper application of chills to *L*, *T*, *Y* and *X* connections or special castings designed to withstand exceptionally high temperatures and pressures. Core chills are avoided wherever possible for several reasons. They are more likely to cause defects than outside chills because any gas generated does not have a free exit. A greater number is required on long run jobs. Often they stay in the casting until after the heat treatment. They deteriorate rapidly and have to be replaced. An exception is noted in flanged fittings where chills are used in the lower half of the core to cover approximately 120 degrees of the inner flange circle.

A number of slides illustrated the design of various chills and their method of application to different shaped sections. A considerable part of the paper was devoted to a detailed description of methods employed in carrying out the tests. Conclusions drawn from the series of experiments indicated that chill design is as important as size. Chills never should be designed to form re-entrant angles of sand at the sides or ends, except where it is desired to retard or control the chilling effect. Placing of chills requires earnest study. Where chills are used on section junctions it is desirable to have the radii at least one-third as great as the section thickness, but never more than one-half as great.

Paper Arouses Comment

Presentation of the paper aroused considerable oral and written discussion from C. W. Briggs, Steel Founders' Society of America, Cleveland; T. D. West, Symington-Gould Corp., Rochester, N. Y.; R. A. Gezelius, General Steel Casting Corp., Eddystone, Pa.; S. W. Brinson, U. S. navy yard, Portsmouth, Va.; R. C. Woodward, Bucyrus-Erie Co., Milwaukee, and John Howe Hall. Philadelphia.

Committee report on methods of producing steel presented by C. E. Sims, Battelle Memorial institute, Columbus, O., indicated that no revolutionary innovations have been made during the past year. Considerable interest has been shown in the use of the cupola as an adjunct to the steel foundry and the converter either for making finished steel or duplexing in combination with an electric or open-hearth furnace. Reference was made to the electric eye or photoelectric cell adapted to the control of the blow in a converter.

Second session of the steel division was held Thursday afternoon, with H. D. Phillips, production engineer, Lebanon Steel Foundry, Lebanon, Pa., presiding, and R. A. Gezelius, co-chairman. Two papers, both of a research type, occupied the time of the session.

First paper, contributed by the Lunkenheimer Co., Cincinnati, through A. J. Smith and J. W. Bolton, reported an extended investigation which that company had conducted to determine the weldability of some cast and wrought steels widely used in the valve and fittings industry. In the absence of the authors, the paper was abstracted by C. W. Briggs.

In their research, the authors studied the structures of welds under various conditions of preheating, and observed data on the reaction of the steels studied with a regard to hardenability, grain coarsening, formation of hard constituents, etc. The results indicated that under the conditions of the investigation cast steels show at least as good, and in many cases better, weldability than comparable rolled products. The investigation, it was stated, definitely explodes the theory held by some that cast steel lacks the weldability of the rolled products.

Cast steels investigated were: A.S.T.M. A216-39T WCA, A217-39T WC1, A157-39C1 and A217-39T WC4. Rolled steels were A.S.T.M. A206-39T P1 and A182-39F1. S.A.E. 1040 and type 416 stainless. The structure developed in steels of 0.25 per cent carbon were fully as good as in the steel of 0.15 per cent carbon and, so far as granulation was concerned, the wrought steel of 0.15 per cent carbon was inferior.

Concluding, the authors stated: "It is hoped that this work will help to clarify some of the misunderstandings that have arisen and that it will stimulate the foundryman, whose steels are to be subjected to a welding operation, to more extensive study and greater co-operation with the welding engineer. It should suggest to the foundryman that his product, intelligently used, is better adapted to welding usages than some trade opinions might lead one to believe.

Study Use of Chaplets

Since the influence of chaplets on the soundness and integrity of steel castings has been a point of grave concern since their advent with the industry, Howard F. Taylor and Edward A. Rominski, division of physical metallurgy, Naval Research laboratory, Anacostia, D. C., undertook a comprehensive study of the matter in the interests of bringing to light some of the many factors operative in governing the fusion characteristics of the various types of chaplets available. Results obtained they reported in a paper.

Many castings, Mr. Taylor stated, are rejected or repaired because of lack of fusion or some other defect occurring in the vicinity of a chaplet or intetrnal chill. The former, it was emphasized, is really a specialized form of the latter. In their investigation, the authors used nickel, copper, silver, cadmium, and combination silver-cadmium plated chaplets, as well as aluminum sprayed, aluminum dipped, calorized, tin-dipped and some of the new silicon impregnated varities.

Conclusions reached were that most desirable chaplet design has not been attained; more consideration should be given to storage and handling of chaplets, a good grade of low-carbon steel is well chosen for chaplet material; silicon impregnated chaplets fuse readily; copper and nickel-plated types prove satisfactory when properly prepared and kept clean; silver-plated types were the most consistently satisfactory; and so-called streamlining would obviate the tendency of gases to form and localize in indented areas.

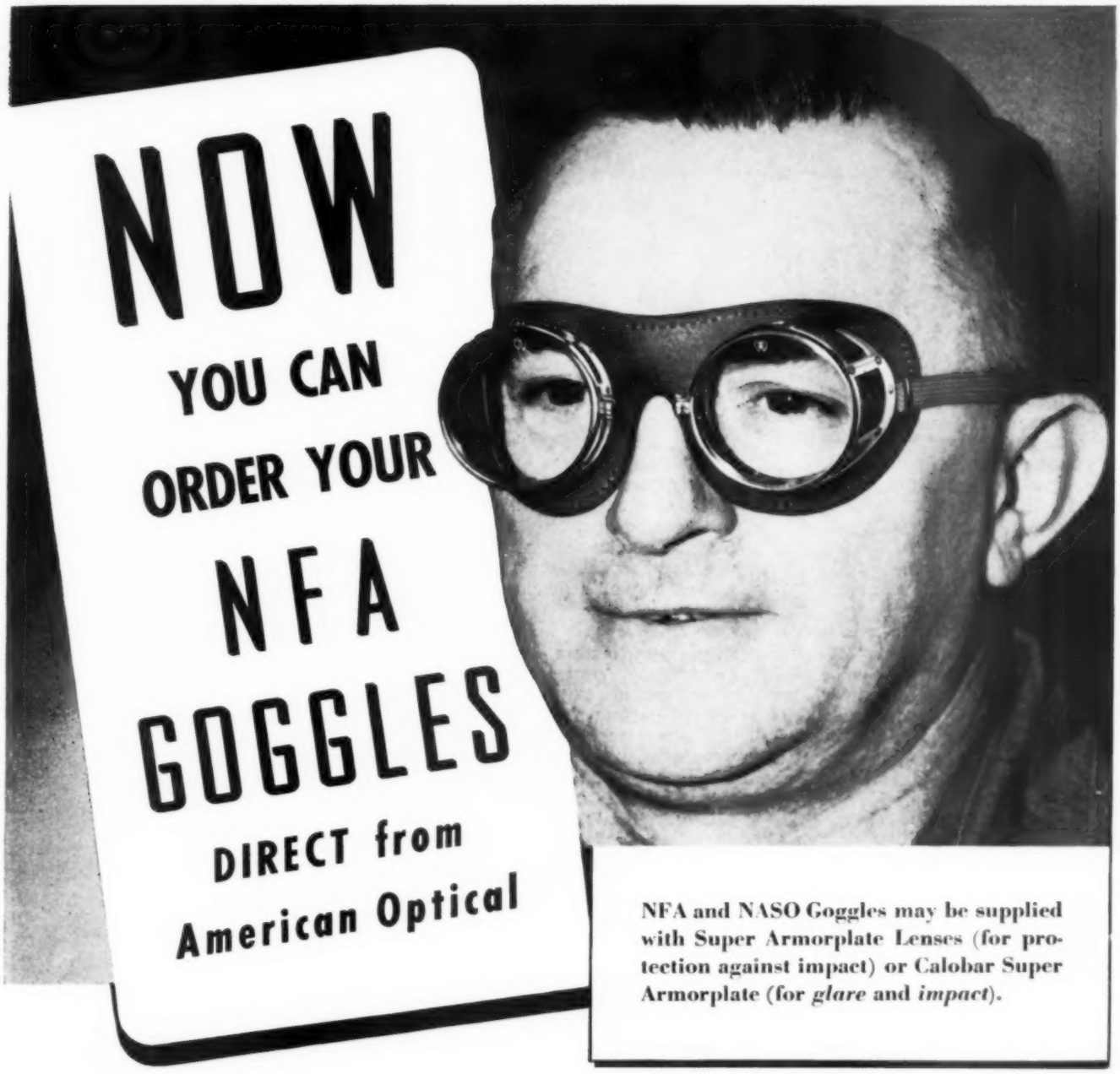
Develop Successful Technique

S. W. Brinson, joint author with J. A. Duma, assistant metallurgist, U. S. navy yard, Portsmouth, Va., presented a highly interesting and practical paper, "Application of Controlled Directional Solidificvation to Large Steel Castings," at the Friday morning session. A number of slides showing a wide variety of heavy castings illustrated a successful foundry technique developed in the foundry of the Norfolk navy yard for the production of large and intricately shaped castings to meet rigid navy specifications. Technique includes the use of miniature models for a critical study of the proposed design prior to construction of the actual patterns; insistence on the application of the principles governing directional solidification; practice of relieving molds and cores mechanically after pouring; use of synthetically bonded silica sand mixtures in mold construction; high quality steel; constant and wide spread use of gamma-ray examination of the internal structure of all critical sections. The speaker commented on all these features in typical steel castings.

Text of the address also contained detailed tables showing steel molding and core sand mixtures for complicated castings, for heavy section castings and large cores of fairly harmonious design, for copes, for backing sand, for interior cores where high green strength is required and for interioir and exterior cores where green strength is not an important factor. One or a combination of two or more of the following methods are employed to promote directional solidification. Banking or partial reversal 20 to 45 degrees; top pouring of risers; heading; gating, multiple and stepwise; chilling, coring design, etc. The session closed with a brief report of the committee on radiography by C. W. Briggs.

The round table luncheon discussion Friday featuring gas control in steel castings was led by J. C. Caine, Sawbrooke Steel Casting Co., Cincinnati; G. A. Lillieqvist, American Steel Foundries, East Chicago, Ind., and C. E. Sims.

Reports of other interesting sessions held during the Chicago convention will be presented in the July issue of THE FOUNDRY. —The Editors



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SPLENDID EXHIBIT

Reveals

Progress in Equipment and Supplies

(*Continued from page* 41)
ever shown at any exhibition held in connection with a convention of the American Foundrymens' association. This new and improved mixer weighs 21 tons and is equipped with control apparatus which converts it into a self contained automatic machine. The timing apparatus can be set for any desired cycle. Without any further attention the machine measures the batch of sand, adds water, any type of binder, mulls the sand for a definite period, discharges one batch and immediately repeats the cycle with another batch. Standard Sand & Machine Co., Chicago, had its booth arranged as a rest room for visitors.

Machines Mix Sand

Newaygo Engineering Co., Newaygo, Mich., showed shakeout sand units for handling, cooling sand, removing tramp material and controlling dust and sand grain size. The company also showed tempered sand units for handling, cutting, blending, aerating, screening and cooling foundry sand. A number of photographs showed typical installations. Working models of dust arrestors, also vibrating screens, sand conditioning and sand reclaiming units were shown at the booth of the Productive Equipment Corp., Chicago.

Royer Foundry & Machine Co., Kingston, Pa., showed sand separators and blenders, portable shakeout and sand conditioning unit and a stationary type shakeout with what is claimed to be an entirely new application of the vibration principle. None of the vibration or shock is transmitted to the frame. The portable type shakeout is a combination machine designed primarily for handling small molds on the floor. The machine shakes them out, separates the castings and scrap from the sand, tempers the sand, and discharges it to any desired position through the same separator and blender. Heavy duty shakeout, portable and semiportable screening and sand conditioning units in various sizes were shown in operation at the booth of the Simplicity Engineering Co., Durand, Mich. Robins Conveying Belt Co., Passaic, N. J., showed in operation a small, full floating shakeout for flasks up to 500 pounds, a primary riddle, a working model of a laboratory screen, as well as a variety of roller conveyors.

The diversified exhibit of machines for cleaning castings was an outstanding feature of the exhibit. Attractive displays were combined with the first showing of several new developments in the field of cleaning equipment. American Air Filter Co., Louisville, Ky., attracted attention with an operating model of an electrical precipitation unit, an operating model of a dust control system which was constructed of lucite to permit observation in operation, an automatic air filter of the self-cleaning type for ventilating purposes, and other operating models of the dust control units manufactured by that company.

Clean Castings Mechanically

American Foundry Equipment Co., Mishawaka, Ind., presented a large and interesting display of equipment, which included a new continuous type tumbling unit using airless abrasive blasting, a new combination of tumbling and table type machines into a single airless abrasive blasting unit, a new cyclone type dust collector, and a new wet disposal system for dry type dust collectors. The company also showed bag type dust collectors, and sand cutting machines. Hydro-Blast Corp., Chicago, presented an interesting model of a complete hydroblast unit for cleaning castings and recovering sand. The model included a room for the blasting, and the necessary equipment for collecting, elevating, and classifying the sand. This removes the fines, returns the amount of sand required for the blasting equipment, and deposits the remainder in pans for transportation to the foundry where it is used as molding sand. The company also displayed two types of guns, one used by a man operating inside of the room, and the other operated by the man stationed outside of the room.

Pangborn Corp., Hagerstown, Md., illustrated much of its line of airless blast cleaning equipment, including barrels, tables, rooms, and special machines, as well as dust control systems, helmets, abrasives, etc., with an extensive display of illuminated photographs. The company also exhibited a variety of castings, both as they came from the shakeout and after cleaning with the airless blasting equipment. Parsons Engineering Co., Cleveland, presented a new centrifugal type of dust collector, wet wash dust collectors, and sandblast equipment.

Glass Walls Permit Inspection

N. Ransohoff, Inc., Cincinnati, operated a wet process cleaning mill with loader, automatic sludge remover, automatic star return, and a unit to heat the compound so that the castings will dry by their own heat when removed from the mill. The company also showed a cleaning unit for large and fragile castings. Schmieg Sheet Metal Works, Detroit, exhibited an operating model of a wet type dust collector which was built with glass sides to permit observation of operating principle.

Claude B. Schneible Co., Chicago, displayed a working model of its wet type dust collector, a dewatering unit, a hood for removing dust from the shakeout, and many photographs of equipment installations. A new airless blast mill with loader and dust collecting equipment, was featured by the W. W. Sly Mfg. Co., Cleveland. That firm also exhibited a new airless blast rotary table, the new airless blast mechanism, dust filters, helmets, and protective equipment, and illuminated photographs showing the company's line of tumbling mills, sandblast rooms, and tilted tumbling mills.

Supply of materials for the cleaning room was further enhanced
(*Continued on page* 108)

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(*Continued from page* 106)

through displays of companies supplying abrasives and portable tools of various types. Abrasive Co., Chicago, presented a line of foundry snagging wheels in a number of sizes and shapes, abrasive disks, and a new-abrasive flange for high speed foundry snagging. A demonstration of the use of portable electric grinders, sanders and other tools featured the booth of the Black & Decker Mfg. Co., Towson, Md. The company also showed floor and stand grinders and wire brushes.

Carborundum Co., Niagara Falls, N. Y., exhibited an extensive line of grinding wheels and other refractory shapes, against an artistic background. That company also showed silicon-carbide briquets for cupola additions, and refractory shapes including crucible furnace linings. Continental Roll & Steel Foundry Co., East Chicago, Ind., displayed polishing and buffing machinery and air exhaust unit for grinders and buffers.

Small Wheels in Operation

Macklin Co., Jackson, Mich., displayed a variety of grinding wheels in many sizes and shapes, as well as other abrasive shapes. An attractive feature of this display was several small models operating a very small swing frame grinder and a stand grinder, and actually producing the sparks from the grinding wheel. Mall Tool Co., Chicago, exhibited four models of flexible shaft grinders providing facilities for both snagging operations. The company also displayed portable electric grinders. Mid-West Abrasive Co., Detroit, displayed a number of grinding wheels in varying sizes and shapes, aluminum oxide cloth, and fiber back disks.

Background of the Norton Co., Worcester, Mass., included two large circular shapes covered with abrasive materials to represent wheels. The company also showed fused magnesia, aluminum oxide and silicon carbide abrasive grain, and numerous wheels and abrasive shapes. Rotor Tool Co., Cleveland, showed portable air grinders, sanders, drills and reamers, and portable electric grinders, sanders, drills and nut setters.

Melting equipment for ferrous and nonferrous metals and alloys, which employed various types of fuel, was displayed by a number of manufacturers. Campbell-Hausfeld Co., Harrison, O., showed several units including a 400-pound, crucible-type tilting furnace for melting aluminum, a 675-pound, brass furnace of the same type, and two smaller stationary units for No. 60 and No. 80 crucibles. Crucible Furnace Co., Charlottesville, Va., displayed several coke-fired furnaces for nonferrous work, and a 24-inch diameter cupola using 3 individually motor driven, small blowers attached to the tuyeres to supply the necessary blast. Nonferrous furnaces shown were designed for hot or cold blast and had capacities from No. 80 to No. 300 crucibles.

Show Many Furnaces

Ajax Electric Furnace Corp. division, Ajax Metal Co., Philadelphia, had its booth arranged as a rest room for visitors. Fisher Furnace Co., Chicago, exhibited a number of oil and gas-fired crucible melting furnaces in both stationary and tilting types. Stationary types had capacities from No. 30 to No. 80 crucibles while the tilting type shown carried a No. 225 crucible. In addition the firm displayed combination blowers and oil pumps, and oil and gas burners. Detroit Electric Furnace division, Kuhlman Electric Furnace Co., Bay City, Mich., exhibited its new conical design shell, 350 and 500-pound electric furnaces, completely equipped with automatic controls. Features were a new automatic control panel, new cable connectors, and new electrode bracket. The firm also showed a new transformer with external tap changer. Pittsburgh Lectromelt Furnace Corp., Pittsburgh, had its booth equipped as a rest room for visitors, and used a background of photographs of its electric furnace installations.

To supply air under pressure, which is so essential to many of the previously mentioned melting units, numerous types of blowing units were shown, and included positive displacement and centrifugal blowers. Roots-Connersville Blower Corp., Connersville, Ind., exhibited several of its positive displacement blowers including a 1000 to 1300 cubic feet per minute unit with a plate glass top to show the interior; a small 150 cubic feet per minute blower for gas or air, and a 200 cubic feet per minute centrifugal type blower for similar applications. Allis-Chalmers Mfg. Co., Milwaukee, displayed a large centrifugal type blower equipped with a Foxboro Co. air-weighing control. In addition the firm showed a 4-foot by 6-foot shake-out vibrating screen and a low-head type vibrating screen. Other equipment displayed included a high pressure pump for hydraulic cleaning, pulleys for v-belt drives, and an industrial tractor with a 19 horsepower engine and a 13.5 horsepower capacity at the drawbar.

Air Control Unit

Ingersoll-Rand Co., New York, exhibited its centrifugal type blower with air weighing control and a 280-cubic feet per minute compressor in operation. Other equipment included pneumatic hoists, portable tools such as rammers, grinders, drills and hammers. Foxboro Co., Foxboro, Mass., displayed its air weighing control device for cupola blast which was operated in conjunction with a centrifugal blower made by the Spencer Turbine Co. The air weighing device included a recorder, and the firm also showed a potentiometer recording device.

Whiting Corp., Harvey, Ill., exhibited a wide range of foundry equipment which was featured by a 4-scene diorama depicting its equipment in the foundry. One showed a foundry stockyard, another a cupola room, a third was a scene in a converter steel foundry, while the fourth showed a malleable shop employing a duplexing unit of cupola and air furnace. Ladles of various types, and operating models of cupola charging devices also were shown. Modern Equipment Co., Port Washington, Wis., displayed a number of its covered, insulated ladles including a 2000-pound cylindrical, 400-pound vertical, and 1000-pound cylindrical with a pouring device. In addition a 3000-pound insulated and covered mixer ladle, and trolley type crane were exhibited. Motion pictures of its installations of equipment also were shown. W. S. Tyler Co., Cleveland, exhibited sections of its various types of screens,

(*Continued on page* 110)

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THE FOXBORO AIR WEIGHT CONTROLLER

is easily adaptable to large or small cupolas in connection with present blower equipment. It is listed as a standard blower accessory by all the leading suppliers of foundry equipment.

More than 200 foundries from coast to coast are now in the "star" classification – assuring themselves of uniform cupola conditions and consistent high-quality castings with Foxboro Air Weight Control. At the Foundry Show, this proved method for reducing pouring problems was a center of interest and discussion. "That's what *we* need," said one practical foundryman after another, "to put our foundry on the map." » » » The Foxboro Air Weight Controller is a simple, fool-proof unit for delivering the correct *weight of air* to the cupola, regardless of temperature or barometric conditions, of resistance in tuyeres or cupola, or even of motor or blower efficiency. » » » Why not check the facts for yourself. Just write Foxboro for the names of foundries near your own where you can see Air Weight Control in operation . . . and check its worth in assuring uniform pouring temperatures, quicker temperature rise, identical heats day in and day out.

FOXBORO

REG. U. S. PAT. OFF.

CUPOLA AIR WEIGHT CONTROL

THE FOXBORO COMPANY, 32 NEPONSET AVENUE, FOXBORO, MASS., U. S. A.

(*Continued from page* 108)

its rotary-tapping, testing sieve shaker, standard testing sieves, and photographs of shakeout and other screens.

Foundry Equipment Co., Cleveland, showed a rolling drawer core oven and a rack type oven with a gas-fired, external recirculating heating system. Its oil-fired recirculating heater and sections of core carriers for horizontal and vertical continuous ovens were displayed as well as numerous enlarged photographs of installations of core ovens. Paul Maehler Co., Chicago, had in operation one of its truck type ovens for core drying with automatic electric control. The firm also showed a small cabinet or rack type oven. Both units were equipped with an externally fired heating chamber.

Show Furnace Refractories

American Crucible Co., Shelton, Conn., displayed silicon carbide and graphite crucibles and refractories such as nonferrous furnace linings, skimmers, and patching cement. Joseph Dixon Crucible Co., Jersey City, N. J., exhibited one of its large graphite crucibles, and a number of graphite and clay stoppers, nozzles and sleeves. Lava Crucible Co. of Pittsburgh, Pittsburgh, showed several crucibles and various refractories such as ring linings, furnace covers, base blocks, and patching cement for all types of furnaces. Vesuvius Crucible Co., Swissvale, Pa., exhibited several sizes of crucibles, crucible covers, base blocks, and graphite stopper heads. National Carbon Co., Cleveland, had its booth equipped as a rest room for visitors. International Graphite & Electrode Corp., St. Marys, Pa., showed a number of graphite electrodes including a 24-inch, a 12-inch, and a 6-inch diameter electrode.

Portable and wall type indicating pyrometers, direct reading air velocity meters, and immersion type nonferrous pyrometers were displayed by the Illinois Testing Laboratories Inc., Chicago. Pyrometer Instrument Co., New York, showed a new, special optical-type pyrometer for open-hearth furnace work with a range from 2300 to 3200 degrees Fahr. That firm also displayed other types of optical pyrometers, surface pyrometers, and immersion type pyrometers for nonferrous work with interchangeable exposed and protected thermocouples. Wheelco Instruments Co., Chicago, exhibited temperature indicating, control and recording devices, and a safety control for combustion which closes the valve when the flame goes out. Louis G. Robinson Laboratories, Cincinnati, showed its combustion control calculator for cupolas. The instrument is somewhat similar in construction to a slide rule, and enables the cupola operator to determine the most suitable air, coke and carbon ratios.

Metallographic equipment was featured by Bausch & Lomb Optical Co., Rochester, N. Y., and included a new 5 x 7-inch photographic unit. The firm also displayed a Littow spectroscope, numerous microscopes including a new binocular type metallographic microscope, toolmakers' microscopes, optical flats, and an orthostereo camera and viewing stereoscope. Adolph I. Buehler, Chicago, exhibited metallographic microscopes and cameras, specimen grinder and polishing tables for preparation for metallographic examination. Included in the display was a new cutting off machine which handles pieces up to 4 inches high and 6 inches long. The firm also featured complete equipment for a relatively low cost metallographic laboratory designed for use in the smaller foundry. Tinius Olsen Testing Machine Co., Philadelphia, had in operation its new 60,000-pound universal testing machine. It is hydraulically operated and is supplied with attachments for making tension, compression, transverse and hardness tests. Riehle Testing Machine division, American Machine & Metals Inc., East Moline, Ill. exhibited its 60,000-pound universal, hydraulic, and 60,000-pound universal screw power testing machines. In addition a combination 110 to 220-foot pound impact testing machine was displayed; all machines were in operation.

Sand Control Apparatus

Harry W. Dietert Co., Detroit, exhibited in operation a wide variety of foundry equipment for controlling sands, cores and molds; apparatus for determination of sulphur, carbon, fluidity and chill, and spectrographic apparatus. New apparatus featured by the firm included a sintering point determinator for sands, streamlined and compact, a combustion furnace with built-in temperature indicator, transformer and control equipment, and an improved moisture teller with automatic electric time and temperature controls.

As is usual at foundry exhibitions, the foundry supply houses were well represented. Confronted with the impossibility of displaying their entire lines, the participants in the show concentrated on a few important items. Federal Foundry Supply Co., Cleveland, exhibited a variety of flask pins, twisted stem chaplets, seacoal, bentonite bond, rubber handle shovels, samples of plumbago, core wash, blacking, and a wire cutter and vibratory sand sifter. Hill & Griffith Co., Cincinnati, had a booth fitted up as a rest room.

J. S. McCormick Co., Pittsburgh, provided an artistic background for displays of spring type chills, and a series of test cores made with the binder made by that company. Samples of blacking and core and mold wash also were shown. S. Obermayer Co., Chicago, exhibited an electric mixer for mold and core wash, a core pasting machine, a dust collector for a grinding and snagging bench, shovels and clamps. Smith Facing & Supply Co., Cleveland, provided an artistic setting for information featuring core compounds, core wash, blackings, plumbago, seacoal, core paste, facings and partings.

Frederic B. Stevens, Inc., Detroit, used an illuminated colored photograph of a foundry pouring scene as a part of the background. The company also showed samples of plumbago, seacoal, parting, core wash, blacking, core compound, core daub, core paste, and a casting used in a fluid type of automobile transmission. United Compound Co., Buffalo, featured a variety of sizes of core vent wax, and pattern wax. United States Graphite Co., Saginaw, Mich., exhibited No. 8 Mexican graphite, plumbago and core dip, mold wash and graphite parting. A moving background illustrated uses of the various products.

Miscellaneous foundry supplies were displayed by several firms. Combined Supply & Equipment Co., Buffalo, showed a wide variety of plain and special chaplets, also reels of vent wax in various shapes and sizes. Single patterns, cope and drag plates, for which claim is made for nonshrink, accuracy, etc., were exhibited by the Electro-Chemical Pattern & Mfg. Co., Detroit. In that process the original mold is made in plaster and the new pattern is made by electrical deposition of a copper shell in the plaster mold.

Display Many Items

Foundry Supplies Mfg. Co., Chicago, showed roto-adjustable vibrators for continuous service, electric sand riddles, electric vibrators and universal fineness testers. Pattern shop and foundry supplies and equipment, mahogany and pine pattern lumber, magnesium pattern plates and pattern letters were exhibited by the Freeman Supply Co., Toledo, O.

Kindt - Collins Co., Cleveland, showed streamline models of disk and spindle grinders connected to individual dust collectors. Miscellaneous supplies, letters, dowels, pins, bushings, vibrators, pattern metal were displayed attractively. Oliver Machinery Co., Grand Rapids, Mich., attracted considerable attention with sanders, disks, lathes, band saws, circular saw and routers in operation. An interesting display of a wide variety of plain and intricate patterns and coreboxes made

(*Continued on page* 112)

SHARP for Fast Cutting . . .

An Important Feature of NORTON RESINOID WHEELS

IN the foundry where the problem is speedy stock removal, fast cutting action is the characteristic by which grinding wheels are most frequently judged. So the Norton research laboratories set out to produce a "sharp" wheel—one whose cutting action would not easily dull. They started by subjecting the abrasive to special treatments to weed out all but the strong, solid grains that would withstand the severe service of foundry grinding. Then countless resinoid bond formulae were carefully studied and experimented with to develop one with just the right strength—a bond that would hold each grain firmly until its job was done but then release it to bring fresh, sharp grains into action. The result is a definitely faster cutting action—and lower grinding costs for you.

There's a complete line of Norton Grinding Wheels for every job in the foundry—Alundum, 15 Alundum and Crystolon abrasives; resinoid, rubber and vitrified bonds.

NORTON COMPANY
WORCESTER, MASS.

New York, Philadelphia, Cleveland, Chicago, Pittsburgh, Hamilton, Ont., Detroit, Hartford

W-761

NORTON ABRASIVES

(*Continued from page* 110)
on these machines was mounted on the back wall.

A wide variety of pressure cast aluminum matchplates and patterns were shown by the Reliable Pattern & Castings Co., Cincinnati; and the Scientific Cast Products Corp., Cleveland and Chicago. Foundry chaplets, hinge tubes and special tin forms in almost infinite variety were shown at the booth of the Smith & Richardson Mfg. Co., Geneva, Ill.

Pattern and other lumber was shown by two firms. White Pine Lumber Co., Chicago, exhibited northern white pine and sugar pine in various thicknesses for pattern work, and pine plywood for matchplates, mounting boards, and follow boards. Also displayed were wood patterns and flasks, and motion pictures of logging and other lumber preparation operations were shown. Edward Hines Lumber Co., Chicago, displayed samples of four types of pattern lumber including Idaho pine, ponderosa pine, northern white, and sugar pine. A wide variety of other woods also were shown.

Rapid Matchplate Production

Tamms Silica Co., Chicago, exhibited its line of pyrometric equipment, a new viscostat or fuel oil heating device, and demonstrated the practical application of its pattern compound for rapid matchplate production.

Displays of producers of various alloys used by the foundry industry were especially attractive and illustrated the applications of the various materials in the manufacture of both ferrous and nonferrous castings. Climax Molybdenum Co., New York, employed a beautiful background to illustrate the uses of various alloy castings, and presented information on its ferromolybdenum, calcium molybdate, and molybdenum trioxide. Electro Metallurgical Co., New York, showed samples of alloys for ladle additions, including a special graphitizer, foundry grade of ferrochrome, ferromanganese, ferrovanadium, ferrosilicon, zirconium alloy, calcium-manganese-silicon, calcium-silicon and several types briquets.

International Nickel Co., New York, exhibited a large power shovel sprocket cast of nickel steel, a nickel bronze worm wheel, an alloyed cast crankshaft, for a diesel engine, and a variety of permanent magnets which have a nickel content of 32 per cent. The background of the booth illustrated alloy cast steels, alloy cast irons, and brasses and bronzes. Titanium Alloy Mfg. Co., Niagara Falls, N. Y., featured photographs of a large alloy cast steel rotor turbine, as well as foundry ferrotitanium, chrome - titanium - silicide, silico-titanium, and zirconite sand and flour which are used as facing and wash material. Ferroalloys for the foundry industry were displayed by the Vanadium Corp. of America, against an interesting and attractive background. That firm exhibited samples of ferrosilicon, ferrovanadium, ferrotitanium, ferrochromium, copper-vanadium, chrome metal, alsifer, and graphidox.

A foundry control hoist operated on a monorail by a positive drive was featured by the Louden Machinery Co., Fairfield, Iowa. Traveling chain block and an electric hoist also were displayed. Numerous photographs showing various applications of the company's product were mounted on a display board and formed the background of the company's exhibit. Conco Engineering Works, Mendota, Ill., featured a 250-pound capacity electric hoist, a panel of blown-up photographs depicting the various hoisting operations in foundry practice. Electric Controller & Mfg. Co., Cleveland, had a 29-inch magnet operating in a steel tower to demonstrate its new dynamic lowering alternating-current crane hoist controller. No mechanical load breaker is required. Its display also embodied a photograph of a double magnet for unloading scrap from river barges and also one of a motor room.

Link-Belt Co., Chicago, had in operation a bucket conveyor and displayed its various type antifriction bearings on a revolving stand. Other equipment shown included screens, transmissions, speed reducers, sand revivifiers, mold conveyors and various types of chain. In the booth of the Chain Belt Co., Milwaukee, a section of an apron leakproof conveyor and a mold car were mounted on individual tables above inclined mirrors so that the under construction might be observed. The company also showed flat spray nozzles, various sizes of chain links, idler rolls and illuminated photographs of chain belt conveyors.

Equipment Handles Cores

A pneumatic core transport and a resilient multiple-shelf core truck handled by crane or lift truck were exhibited by the Chicago Mfg. & Distributing Co., Chicago. The company also showed cold chisels, gaggers, floor flasks, a bag-holding truck and a new type steel bottom board, as well as fireproof boards.

A feature at the booth of the Harnischfeger Corp., Milwaukee, was the demonstration of its electrodes by a robot arc welder. However, actual welding was performed by an operator inside a welding booth and readily observed through dark glass windows. A model of the company's single-line bucket was encased and showed the adaptability to sand handling. Yale & Towne Mfg. Corp., Philadelphia, displayed a portion of its line including a scale truck, a multiple lift truck, electric monorail hoist and a skid handling truck with a capacity of 10,000 pounds. Illuminated photographs of electric power trucks were arranged at the rear of the exhibit.

Display of the Mercury Mfg. Co., Chicago, included electric lift trucks of 3000 and 6000 pounds capacity, a rubber-tired caster trailer with safety self-couplers and platforms of wood or safety-tread plate, a 4-wheel gas industrial tractor, a tractor built with a corrugated bottom and ribbed sides for handling castings. Two gas-electric power units for industrial trucks were exhibited by the Ready-Power Co., Detroit, which also employed a panel of six large photographs to depict lift trucks at work on the foundry floor.

Many Lift Trucks Shown

Automatic Transportation Co., Chicago, demonstrated both a low and high-lift elevating platform truck of 6000 pounds capacity and showed various illustrations of heavy-duty trucks in service in various foundry applications. Elwell-Parker Electric Co., Cleveland, operated a center control, fork lift telescoping truck with capacity for 3000 pounds and an electric-operated crane truck of similar capacity. The company also displayed a 6000-pound low lift gas-operated platform unit and an electric truck with a power scoop.

Foundry iron in small pig form was on display at various booths of merchant iron producers. Republic Steel Corp., Cleveland, had different shapes of cast iron pipe in its booth as well as steel flasks made by its Truscon Steel Co. division. The background of panel views showed a mixer delivering hot metal and a foundryman pouring a casting. Various types of castings from high-test pressure valves to piston rings were shown at the booth of the Sloss-Sheffield Steel & Iron Co., Birmingham, Ala. as well as small pigs and ferromanganese. A large photograph of a mixer ladle of 250,000 pounds holding capacity for handling hot metal between the blast furnace and pig machine was displayed.

Exhibit of the Bethlehem Steel Co., Bethlehem, Pa., included foundry nails, annealed wire, wire rope and strand; castings for a diesel engine head, machine-tool parts, elevator sheave, locomotive cylinder liner made from mayari iron. Two transparencies on revolving stands showed ore mining operations and applications of pig iron. A replica of hot metal flowing from the blast furnace runner into an open-top ladle was on view at the booth of the Wisconsin Steel Co., Chicago. The background also included an illuminated photograph of mixer met-

(*Continued on page* 114)

THE STORY OF MORE THAN
800 ROTO-CLONE INSTALLATIONS
...told in word and picture
The 79 installation photographs shown in this Roto-Clone Dust Control Book were made in the plants of 52 companies who have purchased more than 800 Roto-Clones since 1932.
You'll find the solution of your dust problem in this book—the coupon will bring you your copy.
AAF
AMERICAN AIR FILTER CO., INC.
INCORPORATED
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AMERICAN AIR FILTER CO., INC., 712 Central Avenue, Louisville, Kentucky
Please send me without obligation your new booklet illustrating Roto-Clone in Foundry use.
Name
Company
Address

(*Continued from page* 112)
al being poured into the open hearth and a blast furnace cast house with the furnace casting. Samples of small pigs as well as automobile castings and an International truck engine in slow operation were shown.

Hanna Furnace Corp., Detroit, displayed the name "Hanna" in large sparkling letters resting on a large model pig. Hickman, Williams & Co., Chicago, displayed a wide assortment of alloys in a glass case, foundry coke in sizes No. 1 to 3, inclusive, and charcoal pig iron. The background of its booth was a map showing its ten offices in the United States spotted by electric lights. Foundry coke in sizes A to No. 4 was featured by the Semet-Solvay Co., New York. Coke of this grade as well as various coke by-products were shown attractively by the Republic Coal & Coke Co., Chicago.

Nonferrous Ingots Displayed

A miniature cupola with the melt running into a ladle was shown by the Wheeling Steel Corp., Wheeling, W. Va. The company also showed a pile of foundry coke, various pieces of which were made into souvenir paper weights by an attendant operating an abrasive cutting machine. Pickands Mather & Co., Cleveland, made their booth serve as headquarters for visitors.

Especially outstanding at the show was the unusually large representation of producers of secondary brass, bronze and aluminum ingots for foundry use. Nearly twice as many companies had booths compared with 1938. Most of these booths were simple in design and did not attempt to show too many products. Ajax Metal Co., Philadelphia, had a large neon sign at the back of its booth in celebration of its 60th year in business. Featured was a high-silicon brass alloy for forgings, as well as sand and die castings. Also shown was electrolytic manganese produced by a new process. Apex Smelting Co., Chicago, displayed for the first time samples of new products to be offered in addition to aluminum and zinc die casting alloys. These are ferro-vanadium, ferro-tungsten and ferro-titanium produced by the aluminum-thermit process and designed for low carbon products.

One of the new-comers in the field is the Duquesne Smelting Corp., Pittsburgh, with a line of brass and bronze ingots, solders, die-casting alloys, etc., and its booth was among e most unusual in the show, having for a background evergreens and flowers to form a garden setting. Federated Metals division, American Smelting & Refining Co., New York, also had a simple but effective display, the center of which was a revolving ball in which sections of ingots were set. William F. Jobbins Inc., Aurora, Ill., exhibited extremely thin-sectioned castings produced from standard No. 12 aluminum alloy. An electric heater unit was only 14 inches in diameter and had 48 fins. Aluminum products also were shown by U. S. Reduction Co., East Chicago, Ind.

Booth of the Niagara Falls Smelting & Refining Co., Buffalo, was an excellent example of the trend toward simpler booth design, samples of its aluminum alloys and fluxes being artistically arranged in an effective background. Nassau Smelting & Refining Co., Tottenville, New York, presented its line of copper ingots, wire bars and anodes which it produces in addition to brass and bronze ingots, and a new fine copper shot for alloying gray cast iron. L. S. Cohen & Co. and Benjamin Harris & Co., Chicago Heights, Ill., showed sectioned ingots in brass and bronze alloys. Somewhat similar displays were shown by H. Kramer & Co. and R. Lavin & Sons, also of Chicago. Michigan Smelting & Refining Co., Detroit, used large photographs of its brass ingot furnace department, including its mechanical casting machine, for a background.

Showed Cores and Binders

A wide assortment of core oils and binders were shown by a variety of manufacturers. Numerous types and sizes of cores to show the application of binders were displayed by the American Gum Products Co. and Robeson Process Co., New York. Certified Core Oil & Mfg. Co., Chicago, and Corn Products Sales Co., New York, displayed miscellaneous cores for a variety of purposes, and samples of oils and binders. Dayton Oil Co., Dayton, O., presented information on the use of its product.

A new parting made from nut shells was featured by the Delta Oil Products Co., Milwaukee. That company also showed samples of core oils and mold washes. Binders for steel foundry core wash and green sand mold facings were featured by the Hercules Powder Co., Wilmington, Del. E. F. Houghton & Co., Philadelphia, showed its line of core oils, quenching oils, core oven conveyor oil, and cores and castings.

A large core weighing 3000 pounds, and a chilled car wheel weighing 750 pounds, as well as miscellaneous cores showing application of its line of core oils were exhibited by the Werner G. Smith Co. division of Archer - Daniels - Midland Co., Cleveland. The booth of the Smith Oil & Refining Co., Rockford, Ill., served as a rest room for convention visitors. Swan-Finch Oil Corp., New York, showed miscellaneous cores and core oil samples. A painting of fields of soya beans, as well as large photographs of cores formed the background of the booth occupied by the Velsicol Corp, Chicago.

Twelve companies displayed sands, with some booths showing over two dozen different samples. Houghland & Hardy Inc., Evansville, Ind., showed 21 different sand samples, with several large wall photos showing views of the company's sand pits and laboratory. Sand Products Corp., Cleveland, in addition to displaying sand samples, provided an extensive display of cores for a wide range of products. Great Lakes Foundry Sand Co., Detroit, made use of its sands in composing a large wall map of the central states. Peerless Mineral Products Co., Conneaut, O., displayed a variety of sands, one of which was exhibited in scale model of a railway sand car. George F. Pettinos Inc., Philadelphia, presented 22 sands, as well as graphite, hot-patch, and high-temperature cement samples.

Sand Displayed in Wide Variety

Eugene W. Smith Inc., Evansville, Ind., displayed its sand samples in flower pots from which stemmed paper orchids. Whitehead Brothers Co., New York, made use of photoelectric cells to illuminate automatically its displays of sand samples when approached by visitors. Delhi Foundry Sand Co., Cincinnati, exhibited sands, shot, grit, and mill stars, in addition to a colorful display of fluorspar crystals. Ayers Mineral Co., Central Silica Co., and Millwood Sand Co., Zanesville, O., displayed molding sands and operated a portable sand tester. Samples of eight sands, along with brake drum and plumbing castings, were exhibited by Taggart & Co., Philadelphia. Numerous grades of sand were displayed in the booth of Zanesville Sand Co., Zanesville, O., and Industrial Minerals Co., Lancaster, O.

Abrasives exhibits included those of Pittsburgh Crushed Steel Co., Pittsburgh, which drew attention to its booth by using a Translux news projector, which alternately flashed sales material and world news, the latter provided by a news ticker on the immediate location. The company exhibited samples of grit, shot, and abrasives produced by Steel Shot & Grit Co., Boston; American Steel Abrasives Co., Galion, O., and Globe Steel Abrasive Co., Mansfield, O. Steelblast Abrasives Co., Cleveland, presented numerous shot, grit and abrasive samples, as did the booth of Harrison Abrasive Corp., Manchester, N. H., which also used as a background, photomurals of plant interiors. Alloy Metal Abrasive Co., Ann Arbor, Mich., displayed samples of its abrasive blasting shot and grit.

Illinois Clay Products Co., Joliet, Ill., in its display of fire brick and high temperature insulations, made

(*Concluded on page* 116)

One fine furnace sells another

Six-year performance of 50-ton HEROULT ELECTRIC FURNACE *brings repeat order for new 30-ton unit*

AT this plant the 50-ton Heroult Electric Furnace installed in 1933 has given such excellent and low-cost metallurgical performance that when it was decided to increase electric steel capacity, the logical choice was another Heroult Electric unit.

Modern in every respect, this new 30-ton Furnace incorporates many novel features. It is all-welded and is equipped with 20-inch graphite electrodes, the largest ever used. The platform is attached to the shell—tilts with the furnace when pouring. The shell is flared from the floor level to the roof — materially increasing the cold-scrap capacity.

Comparable innovations which distinguish the entire American Bridge Heroult Furnace series are the result of constant striving to perfect the most economical tool for efficient melting and refining of ferrous materials — iron and steel castings — alloy, tool and stainless steels. It is on outstanding performance that these Furnaces have established their reputation. Dependent on size and operating requirements, they are adaptable to hand, chute, machine or drop-bottom bucket charging. They range in capacity from ½ to 100 tons.

Significant is the fact that the world's largest electric furnace with rated capacity of 100 tons, built in 1928 and still producing, is an American Bridge Company Heroult Electric.

Above and at extreme right below, the original 50-ton Heroult Furnace installed in 1933. Below at left, the new all-welded 30-ton Heroult unit recently placed into service when electric steel capacity was augmented. Features that distinguish it include the use of ball and roller bearings on electrode arms and winches; improved wedge-type electrode holders; water-cooled, current-carrying copper tubing arranged to prevent hysteresis and eddy current losses; attached platform which tilts with the shell when pouring.

AMERICAN BRIDGE COMPANY

General Offices: Frick Building, Pittsburgh, Pa.

Baltimore · Boston · Chicago · Cincinnati · Cleveland · Denver · Detroit · Duluth
Minneapolis · New York · Philadelphia · St. Louis

Columbia Steel Company, San Francisco, *Pacific Coast Distributors* • United States Steel Products Company, New York, *Export Distributors*

UNITED STATES STEEL

(*Concluded from page* 114)

souvenir ash trays of clay in a molding machine. Eastern Clay Products Inc., Eifort, O., displayed six types of bonding clays. Insulating products and non-metallics were featured by F. E. Schundler & Co., Joliet, Ill.

A giant pair of safety goggles, with lenses some 15 inches in diameter, drew attention to the display of safety glasses by American Optical Co., Southbridge, Mass. The company also presented its recently-announced lightweight respirator. U. S. Hoffman Machinery Corp., New York, had in operation heavy-duty vacuum cleaning equipment in its booth, which also showed blowers and a portable cleaning unit. Samples of respirator filters used for varying lengths of time on the immediate premises were featured by Martindale Electric Co., Cleveland, in its presentation of protective masks.

Supply Compressed Air

Compressed air used by exhibitors was furnished by the compressors displayed in action by Schramm Inc., West Chester, Pa., which also presented a cut-away model of a large compressing engine to show its operation. Cupola blowers and vacuum cleaners were shown in an effective manner by Spencer Turbine Co., Hartford, Conn. Chicago Pneumatic Tool Co., New York, showed compressors and a line of its pneumatic tools including chipping hammers, rammers, grinders, etc.

Accident prevention equipment, including a long line of goggles, safety clothing, and masks, drew visitors to the booth of Safety Equipment Service Co., Cleveland. Mine Safety Appliances Co., Pittsburgh, showed an extensive range of products, featuring dust-counting apparatus, respirators, and workers' protective equipment.

A large wash fountain, in operation, was exhibited by Bradley Washfountain Co., Milwaukee, which also displayed two other wash fountains and a booth shower.

Displays of foundry flasks naturally were a prominent feature of the show. West Michigan Steel Foundry Co., Muskegon, Mich., presented sizeable examples of its flasks and steel castings. Aluminum slip flasks and jackets of all types were shown by Hines Flask Co., Cleveland. Dowmetal slip flasks, and cast iron and aluminum jackets were a presentation of Fremont Flask Co., Fremont, O. Sterling Wheelbarrow Co., Milwaukee, displayed a variety of flasks, a core plate, and a foundry barrow. Three flasks and numerous parts drew attention to the exhibit of Black-Sivalls & Bryson Inc., Kansas City, Mo.

Silica firestone used for a variety of purposes, including linings for cupolas, mixers, air furnace bottoms, blast furnace linings and the like, were shown by the Cleveland Quarries Co., Cleveland. Pyro Clay Products Co., Oak Hill, O., presented a wide variety of the shapes in which its high-temperature fire brick is available. This brick is made by the dry-pressed process and averages around 52 per cent silica and 41 per cent alumina. Western Materials Co., Chicago, showed both foundry sands and refractories.

Has High Fusion Point

Alpha-Lux Co., New York, showed a ladle lined with its improved refractory lining material which is finer in texture and has a fusion point of 3280 degrees Fahr. Also shown was its hot-top covering for molds. Chicago Retort & Firebrick Co., Chicago, exhibited ladles lined with its products, including a special lining for desulphurizing ladles. Allied Asphalt & Mineral Corp., New York, featured a binder for use in mixing of facing sands and cores. Refractory Mica Products Inc., Irvington, N. J., offered mica products for facings.

Electro Refractories & Alloys Corp., Buffalo, held a guessing contest as to the amount of metal one of its silicon-carbide crucibles would hold. It was claimed to be the largest ever made, with a capacity of 3000 pounds of brass and 1000 of aluminum. The company also announced its entrance into the grinding wheel business.

Linde Air Products Co., unit of Union Carbide & Carbon Corp., New York, displayed samples demonstrating the effectiveness of a new portable machine for flame-cutting risers from castings. Samples of flame gouging also were shown. Air Reduction Sales Co., New York, demonstrated flame descaling and cleaning. The process employs the use of the oxyacetylene torch in connection with brush-type tips which rapidly heats the scale without over-heating the base metal. Wilson Welder & Metals Co., New York, had a welding booth for demonstrating its arc welding machines and electrodes.

Dings Magnetic Separator Co., Milwaukee, had in operation in the central arena a miniature machine demonstrating its system of separating metallic materials magnetically. A new line of rotary files which may be reground was shown by Charles L. Jarvis Co., Middletown, Conn. These files are used to clean and finish hard-to-get-at places in intricate castings. Steel Conversion & Supply Co., Pittsburgh, showed chipping chisels for use in finishing castings.

Charles C. Kawin Co., Chicago, and Edwin S. Carman Inc., Cleveland, both well known in the foundry engineering field, had booths. An increasing tendency is noted toward more efficient foundry layouts and production methods designed to lower costs and improve the competitive position of castings.

International Harvester Co., Chicago, had a large display of trucks, tractors and power units. One tractor shown was equipped with a loader built by Frank G. Hough Co., Libertyville, Ill.

Clersite Co., New York, showed a number of accessory products for the foundry including a flexible drafting tool, hose couplings and a chemical for keeping goggles clean. A variety of sizes and styles of flexible couplings was shown by the Lovejoy Flexible Coupling Co., Chicago.

Motor Is Enclosed

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., exhibited one of its dustproof motors operating in an enclosed chamber in which extremely dusty conditions could be obtained at will, and a sectionalized motor to show construction. International Correspondence Schools, Scranton, Pa., exhibited an array of textbooks used in connection with its various correspondence courses for business and industrial fields. Special stress was given to its apprentice training courses.

Cast Steel Plaque

(*Concluded from page* 49)

a proprietary stainless steel alloy.

The plaque, approximately 18 x 24 feet, was cast in 9 sections in which the largest weighed over 2 tons and the smallest weighed 1200 pounds. The pattern, a full scale plaster model, was shipped from a New York studio to Boston in three moving vans and was insured for $25,000. The plaster model, built on wooden armatures, was heavily reinforced with steel and cement before the sand mold was rammed.

Castings were poured according to the technique usually employed in nonferrous foundries where the metal in thin section has to travel over a wide area. In this instance pop gates were spaced about 1-foot apart and connected with a basin on top of the cope. The basins were filled, the plugs were removed and the metal entered all parts of the mold rapidly and simultaneously. In addition to facilitating pouring of the metal and distribution through the mold, this method of gating equalized the temperature of the casting and the resulting shrinkage and contraction. Obviously this was an important feature where so many sections had to be fitted together to make a harmonious whole. Normal contraction of this metal is ¼-inch to the foot.

George W. Cannon

A • F • A ELECTS FIVE NEW DIRECTORS

Henry S. Washburn

Harold J. Roast

Leroy P. Robinson

B. D. Claffey

THE following five new directors were elected at the recent Chicago convention of the American Foundrymen's association for terms of 3 years each: George Cannon, vice president, Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich.; B. D. Claffey, manager, gray iron and aluminum division, General Malleable Corp., Waukesha, Wis.; Harold J. Roast, vice president, Canadian Bronze Co. Ltd., Montreal, Que., Canada; L. P. Robinson, director, core oil sales, Werner G. Smith Co., Cleveland; and Henry S. Washburn, president, Plainville Casting Co., Plainville, Conn.

George W. Cannon

GEORGE W. CANNON is vice president of Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich., and is one of the three iron molders, who together created the world's largest jobbing foundry consisting of two plants located in Muskegon and a third at South Haven, Mich. He has served as vice president of the organization since its organization in 1908. Mr. Cannon was born at Springfield, Ill., Aug. 11, 1883. As a young man he drifted to Chicago and took a job in an iron works. Through mutual friends he won the acquaintanceship of his two associates in the C.W.C. foundry company, Donald J. Campbell, president and Ira W. Wyant, secretary-treasurer. They met in 1905 and in that year set up an iron works in Chicago. The trio were eager to put into operation ideas they developed for the improvement of foundry business, and needing capital, accepted an offer of the chamber of commerce of Muskegon, then seeking new industries. During the same period another new industry was starting in Muskegon, namely, the Continental Motors Corp., and the trio obtained their first order from Continental. In the first year the organization increased its force to 25 men, and today their operations, when at peak, require 3400 workers. Mr. Cannon has been especially interested in the advance of the industry from the standpoint of metallurgy and the furtherance of hygiene, safety and good housekeeping as a basis of the production of superior products and efficient management.

B. D. Claffey

B. D. CLAFFEY is manager of the gray iron and aluminum division, General Malleable Corp., Waukesha, Wis. Mr. Claffey began his foundry career at the Spring City Foundry Co., Waukesha, 1915, working as laborer, coremaker, molder, and superintendent until 1928. He then was employed as foundry advisor for the Wisconsin Motor Corp. until 1930. At that time he became works manager of the Milwaukee Gray Iron Foundry Co. and remained there until he organized the Claffey Casting Co. in 1933. He served as president and general manager of that organization until 1936 when it was sold to the General Malleable Corp. of Waukesha, and became the gray iron division of that company. Mr. Claffey has been active in the work of the Wisconsin Chapter of the A.F.A. and recently was elected president of that organization. He also was

chairman of the third annual foundry conference committee of the chapter which staged the successful regional foundry conference at Milwaukee in February.

Henry S. Washburn

HENRY S. WASHBURN is president of the Plainville Casting Co., Plainville, Conn., and immediate past president of the A.F.A. Mr. Washburn was born in Brooklyn, N. Y., received his early education at St. Paul's school, Garden City, N. Y., and later attended Yale university. His first commercial position was as bookkeeper with the Corn Exchange bank of New York. From 1906 to 1917 he held various positions as clerk, credit man and office manager with the D. L. & W. R. R., H. B. Claflin Co., and Butler Bros. of New York. From 1917 to 1921 Mr. Washburn was purchasing agent, Turner & Seymour, Torrington, Conn. Since 1921 he has been president and treasurer of the Plainville Casting Co., Plainville, Conn. Mr. Washburn has been greatly interested in foundry technical association work, is a member of the Connecticut Foundrymen's association, the American Foundrymen's association and the Gray Iron Founders' society.

Harold J. Roast

HAROLD JAMES ROAST, is vice president in charge of technical operations, Canadian Bronze Co. Ltd. and its subsidiaries, and is owner of Roast Laboratories, Montreal, Que., Canada. Mr. Roast was born in London, England, in 1882, receiving his formal education at the Henry VIII foundation, Berkhampstead and at the City of London college of which he is a graduate. He went to Canada in 1902 to accept a position as chemist with Milton Hersey Co., Montreal. Later industrial connections have been as follows: Chemist in charge, Canada Iron Foundries, Radnor Forges, Quebec, 1903; associated with Dr. J. T. Donald and also works manager Canadian Carbonate Co. Ltd., Montreal, 1904; general manager, Canadian Magnesite Co., Montreal, and Newark, N. J., 1907; manager, testing department, James Robertson Co. Ltd., Montreal, 1914; vice president and general manager, National Bronze Co. Ltd., Montreal, 1922 and president in 1926. He disposed of National Bronze Co. Ltd. to the Robert Mitchell Co. Ltd., 1928 and was retained by the successor company as metallurgical director 1928-33. In 1933 he became associated with Canadian Bronze Co. Ltd. as technical adviser, and was made vice president in 1935. For 18 years he has been sessional lecturer, McGill university, department of metallurgy. During the war, Mr. Roast acted as metallurgist in charge of shell production. In his technical association connections he represented Canada for several years on the board of the American Institute of Metals, before its absorption by the A.I.M.M.E.; was vice chairman. Canadian section, A.F.A.; chairman, Nonferrous division, A.F.A.; was largely instrumental in the organization of the Canadian Institute of Chemistry and of the Association of Professional Chemists, P. Q. Mr. Roast is fellow, Chemical Society of London, England; fellow, Canadian Institute of Chemistry; member, Engineering Institute of Canada; fellow, Sigma Xi society, McGill Chapter; member, American Society for Testing Materials, and other organizations. He has been a voluminous contributor to scientific journals on technical subjects and to the public press on matters of general interest.

Leroy P. Robinson

LEROY P. ROBINSON is director of core oil sales, Werner G. Smith division of Archer-Daniels-Midland Co., Cleveland. Mr. Robinson was born in Burlington, Iowa, Sept. 26, 1886 and later moved to Mt. Pleasant, Iowa, where he graduated from high school in 1901. He attended Lombard college, Galesburg, Ill., from 1902 to 1906, and was graduated the latter year with a bachelor of arts degree. From graduation until 1917, when he became associated with the foundry industry, Mr. Robinson engaged in a number of totally unrelated and widely diversified occupations. From 1906 to 1908 he was a freight brakeman on the Chicago, Burlington & Quincy railroad, working out of Galesburg, Ill. During the following 2 years, he was engaged in sales promotion work with the Florida Everglades Land & Sales Co., and also was associated with the National Sweeper Co., covering the retail trade in the state of Ohio. From 1910 to 1914 he was in the show business, traveling throughout the United States on the vaudeville circuit. From 1915 to August, 1917, he was in sales production work with the Ojibway Realty Co., Detroit, and then became connected with the Werner G. Smith Co., Cleveland as New England manager where he remained until 1928. Eight years of that period he also represented the Sterling Wheelbarrow Co. in New England. On January 1, 1929, he was made director of core oil sales. Mr. Robinson has been active in the work of the Northeastern Ohio chapter, was chairman of the organization committee and also chairman of the organization meeting, has served on the board of directors and is a past president of that group, serving during 1938-39.

Detroit Foundries

(*Concluded from page* 85)

the job could never be done. But they were convinced it could be done and, starting with the principle of the airplane "joy stick," they evolved a complicated system of hydraulic valves, pumps and cylinders whereby a simple pull or push on the main control lever would guide the machine, much as an airplane pilot maneuvers his plane with the "stick."

LOCAL foundrymen are scanning the national and international skies, not on the lookout for parachute troops, but rather for signs of a favorable business wind arising from increasing pressure for greatly enlarged government expenditures on ordnance and defense materiel, and perhaps for loosening of restrictions on sales of industrial goods and other materials to the Allies.

Of course, some sizable orders for munitions and implements of war already have been placed with industry in this area, many of them "experimental" orders, but some going beyond that category. One recent award was for 200,000 shells of the 92-millimeter class to American Car & Foundry Co., costing a reported $10,000,000. A Buffalo plant of that company now is being rearranged and re-equipped to handle the order, and the Detroit foundry division expects to participate to some extent, probably supplying cast iron liners which are inserted in the outer steel cases before the shell is given its final form.

THE END of this month will see the end of 1940 model production by nearly all manufacturers. July 3 is the date heard when Chrysler divisions will suspend, and also some of the General Motors divisions. Buick is scheduled to go down June 28. Nothing definite has been heard regarding Ford. Changeovers will require one month to six weeks, so the 1941 models should be rolling by Aug. 15. Buick and Packard, as usual, will probably be a step ahead of the others.

The Ford foundry at the Rouge plant is continuing its program of improvement, with steady emphasis on "bringing the mold to the metal" rather than the reverse. Automatic pouring of flywheels has been started, supplementing the automatic pouring of axle housings; plans are under way for further adaptation of this ingenious automatic method.

Donnelly Pattern Co., Detroit now is occupying new quarters and reports peak level of business in wood, metal and plaster patterns, mainly automotive in character.

Reader's Comment

EDITOR'S NOTE — *Material Appearing Under this Head Does Not Necessarily Reflect the Opinion of The Foundry or of Its Editors.*

Centrifugally

To THE EDITORS:

I regret to see that I did not make myself plain in the talk before the Detroit chapter, since your alert reporter states that 30, 36, and 48-inch pipe were made in dry sand molds with loam cores and cast vertically in circular pits. It is true that the larger sizes, that is, 14-inch and above are dried vertically in a pit, but in this plant they are also cast centrifugally with only a socket core. I should like for you to publish this correction and ask your reporter to pardon my Southern accent.

JAMES T. MACKENZIE
American Cast Iron Pipe Co.
Birmingham, Ala.

Much Better

To THE EDITORS:

It was with a great deal of pleasure that I read your editorial in your February issue, in which you commented on Mr. Crane's article that appeared in the January issue of *Machinery*. I drew this to Mr. Crane's attention and his comments might be interesting to you.

"With reference to the physical properties of cast iron, it seems to me that the significant point is not that modern iron is *almost* as good as rolled steel in tension, but that it is *much better* in compression, due to higher carbide or pearlite content. It seems to me that this is the point which should constantly be driven home, although it was not mentioned in THE FOUNDRY'S editorial. This high compression strength can be averaged with a fifty-fifty valuation with tensile strength for most of the applications of good castings. Its further practical utility lies in higher surface hardness so that the products stand up materially better."

C. E. HERINGTON
Meehanite Research Institute
Pittsburgh

Crucible Melting

To THE EDITORS:

In the January, 1940, issue in the Question and Answer department, there is an appeal for help from an individual who has been having trouble with aluminum castings. The metal is melted in cast iron pots. The advisory staff member in his reply merely advises that the cast iron pots should be cleaned carefully at the end of the day.

It seems to me that it would have been perfectly proper and strictly technical for the advisor to have suggested the use of graphite crucibles which are extensively used by the largest and most important aluminum industries as well as by scores of small foundries.

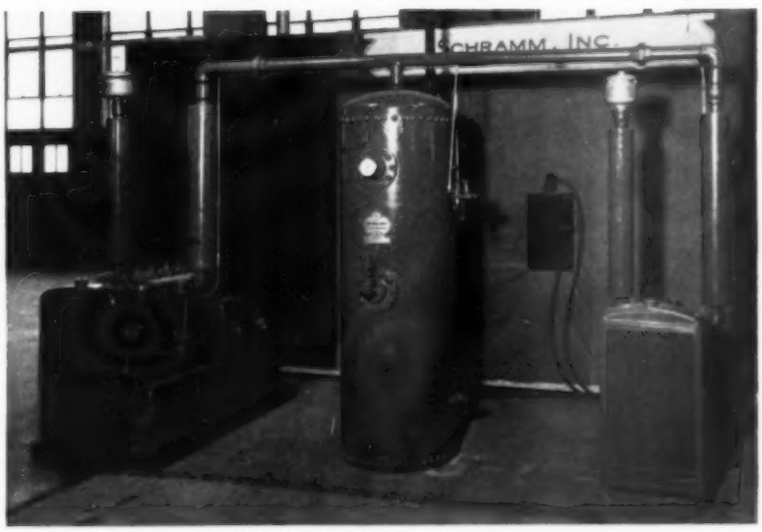
From a metallurgical standpoint the graphite crucibles eliminate iron pickup without the necessity of any irksome precautions and second, the crucible walls are practically impervious to furnace gases. Some metallurgists have concluded that aluminum may be badly gassed by gases admitted through iron crucible walls which are relatively quite porous at higher temperatures

While the initial cost may be higher than for the same capacity gray iron pot (and it is no higher than the price of special heat resisting alloy iron) the life is much higher. It is not uncommon for a graphite crucible of 400-pound capacity, for example, to yield 5-600 heat with an average of 250.

RICHARD H. STONE
Vesuvius Crucible Co.,
Swissvale, Pa.

SCHRAMM

AIR COMPRESSORS



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Built-in Motor Drive
(or V-belt drive, if desired)

Integral Cooling—No Running Water
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No Foundation Required

Built-in Pressure Lubrication to All Bearings

SIZES 25 TO 600 CU. FT.

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Obituary

ROBERT E. MASTERS, aged 91, retired for many years died April 18 in San Diego, Calif. Mr. Masters was born in New York, Dec. 25, 1848. After serving his time in a local foundry he spent about 10 years in responsible foundry positions in the East and Middle West. He then became foundry manager of the Tredegar Iron Works, Richmond, Va., and the remainder of his foundry career either in a managing or consulting capacity was spent in the South and Southwest. For several years prior to retirement he was general manager of the Marshall Foundry, Houston, Texas. A resourceful, ingenious and exceptionally able foundryman, he gave freely the results of his forward looking theories and inventions through frequent contributions to the technical press. Present day foundrymen may be surprised to learn that he was melting a mixture of steel and cast iron in the cupola in the early eighties. A detailed reference to the method and the metal was presented in the Aug. 23, 1884, issue of the *American Machinist*. When a syndicate of American newspapers decided to send a number of industrial writers to Europe at the time of the 1889 Paris exposition, to gather first hand impressions of industrial conditions, Mr. Masters was selected to cover the foundry field. Mr. Masters contributed many articles to THE FOUNDRY.

* * *

Edwin Fitch Northrup, 74, vice president and technical adviser, Ajax Electrothermic Corp., died at his home in Princeton, N. J., April 29. Dr. Northrup was born in Syracuse, N. Y., and received his primary education in the public schools of that city. He graduated from Amherst in 1891, attended Cornell the latter half of the same year, and obtained his doctorate at Johns Hopkins university in 1895. Upon leaving college he worked on various electrical jobs enabling him to visit most of the western part of the United States and Mexico. In 1903 Dr. Northrup and Maurice E. Leeds formed the Leeds & Northrup Co., and he was associated actively with that firm until 1910. From 1910 to 1916 Dr. Northrup did research work and taught physics and electrical engineering at Princeton university. It was while there that he started the development of the high frequency or coreless induction furnace.

Dr. Edwin Fitch Northrup

* * *

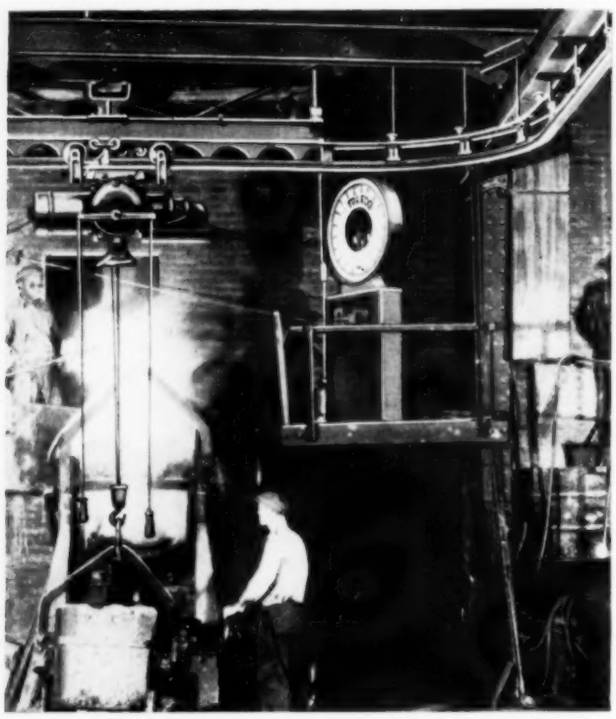
A. E. Brenneman, foreman, Strong Steel Foundry Co., Buffalo, died April 5.

* * *

John E. Walker, vice president, Eastern Malleable Iron Co., Naugatuck, Conn., died at his home in Cheshire, Conn., recently.

* * *

Theodore M. Mickelson, 68, pattern shop superintendent, Allis-Chalmers Mfg. Co., West Allis, Wis., died May 9 at Deaconess hospital after an illness of 2 weeks. Born in Oslo, Norway, Mr. Mickelson came to the United States as a young



Cleveland Tramrail **TRACK SCALE**

Metal from cupola can be conveniently weighed by an overhead track scale built into a Cleveland Tramrail system. This is especially desirable when pouring alloy castings.

Track scales are also advantageous in the shipping department, as castings can be weighed without the need of extra handling.

Cleveland Tramrail equipment is available for every department of the foundry. Have our representative show you how Cleveland Tramrail can reduce costs and improve working conditions in your foundry.

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OVERHEAD MATERIALS HANDLING EQUIPMENT
Other products: CLEVELAND CRANES and STEELWELD MACHINERY

man and obtained employment with the Allis-Chalmers Mfg. Co., where he remained for a period of 48 years. As superintendent of one of the largest if not actually the largest pattern shop in the United States, he was widely known and respected for skill, practical knowledge and administrative ability.

* * *

Thomas W. Sinclair, 65, former superintendent, Union Stove Works, Peekskill, N. Y., died recently at his home in that city. For many years Mr. Sinclair was associated with the stove foundry business at Taunton, Mass.

* * *

Joseph C. Haimerl, 59, formerly proprietor, Baraboo Gray Iron & Aluminum Foundry, Baraboo, Wis., and before that operating a foundry at Waukesha, Wis., died recently at Beaver Dam, Wis., where he had lived for the past 3 years.

* * *

Claude J. Sperry, 56, general superintendent, Renown Stove Co., Owosso, Mich., died April 17 after 2 months' illness. Mr. Sperry had been employed by the Renown company for 22 years and had been superintendent for 7 years.

* * *

Robert Hill, age 58, assistant manager, Birmingham plant, Hill & Griffith Co., died May 4. Mr. Hill learned the foundry trade at Dalton, Ga., working for a number of years in the general jobbing foundry conducted by his father. He joined the Hill & Griffith organization in Birmingham in 1912 serving in various capacities in the operation of the organization on the Southern territory.

* * *

Harry Challingsworth, 59, foundry superintendent at the Garrison plant, Mackintosh-Hemphill Co., Pittsburgh, died recently at his home in Knoxville, Pa. Born in England, Mr. Challingsworth had lived in the Pittsburgh district for 38 years, 37 of which he had been employed by the Mackintosh-Hemphill Co. For 25 years he was foundry superintendent of that firm.

* * *

Charles H. Johnson, 58, executive vice president and director, Gisholt Machine Co., Madison, Wis., died April 23. Mr. Johnson spent his entire life in the machine tool industry, having started to work for the Gisholt Machine Co. as a machinist in 1897. He went to Europe as a demonstrator and assistant in sales, became European manager, and upon his return to Madison in 1918 was made vice president. He became executive vice president in 1932.

* * *

Walter J. Kohler, 65, chairman, Kohler Co., Kohler, Wis., died unexpectedly at his home in that city April 21. Mr. Kohler was a former governor of the state and was well known in the industrial and political world. At 30, upon the death of his brother, he became head of the Kohler company. At one time he was vice president of the National Association of Manufacturers, a vice chairman of the National Industrial conference, and active in other organizations. In 1934 Mr. Kohler was awarded the National Service fellowship by the Society of Arts and Sciences.

* * *

William Abendroth Mills Sr., 71, inventor and a retired foundry owner, died at his home in Port Chester, N. Y., recently. Mr. Mills was born in Jersey City, N. J., and during his business career was identified with several foundries. He was president of the Abendroth Bros. Foundry, Port Chester, from 1901-1905. In 1906 he organized the Globe Foundry Co., in Port Chester which was destroyed by fire in 1911. In 1916 he organized the William A. Mills Brass Foundry, East Port Chester, manufacturing machine gun and other castings during the war period. He retired from active business 3 years ago.

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All Types

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OVER 20 YEARS EXPERIENCE

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Large installation at Packard Motor Co. using recirculating air heater (recently increased capacity about 100%)

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MANY LARGE FOUNDRIES CHOOSE CARL-MAYER OVENS

1. Baking and drying time reduction upwards of 25% in many cases.
2. Fuel savings upwards of 25% in many cases.
3. Design, construction and results of the finest.
4. Every installation under close personal supervision of Carl-Mayer a recognized authority in baking and drying problems with more than 20 years' service to the foundry industry.
5. Pioneers in the development of Metal Insulated Ovens and the Recirculating Air Heater Principle.

Write for literature

The CARL-MAYER Corp.
3030 Euclid Ave., CLEVELAND, OHIO.

ELIMINATE VARIABLES IN CORE TESTING

(*Continued from page* 43)

has been found that if an oven is prepared in advance the test can be performed very easily. A rectangular pan about 3 inches high and as large as the oven bottom is placed in the bottom of the oven. A 15-watt electric light bulb arranged so that it is immersed in the water is placed at one end of this pan. Depth of the water in the rectangular pan should be 2 inches. The light is turned on and left lighted constantly.

Cores are placed on a shelf directly above this pan of water and allowed to stand over night. The electric light bulb furnishes just enough heat to keep the water in the pan between 70 and 80 degrees Fahr. That temperature has been found to be critical. That is, to say, if the temperature goes above 80 degrees Fahr., the cores do not absorb as much moisture as possible, and hence, do not decrease in strength to the same degree. It has been found that cores which possess strengths in the order of 200 pounds per square inch at 100 degrees Fahr. usually drop to 70 to 80 pounds per square inch after standing in the oven over night.

If the cores test below 70 pounds per square inch, the binder is made of material which is considered to be deliquescent; or the cores will cause blow holes in the castings, and a large amount of breakage often results when handling cores. Also, cores sometimes will break if allowed to stand in a mold for any length of time before pouring metal around them.

It is important to know how much gas is given off by core binders when molten metal surrounds them. Amount of gas which a dry sand core gives off when used in the mold can be determined readily by taking a 5-gram sample of the core after it has been tested for tensile strength and placing it in an alundum boat. The sample then is inserted into an electric tube furnace. Temperature of the furnace should be 1920 degrees Fahr. After the sample has been inserted, the furnace is sealed by placing a rubber stopper into the opening at the end.

Measure Gas Volume

As the gases are formed they are collected over water in a calibrated tube or cylinder. Reading of the volume of gas should be taken every 10 seconds, until 30 seconds have passed. Blank tests should be run on the boats and silica sand, and the amount of gas generated by those materials should be subtracted from the total amount given off by the 5-gram sample of dry sand core. It has been found that if a core binder gives off an excessive volume of gas, it may cause difficulties in the foundry.

Following the procedure outlined makes it possible to check tensile strengths of cores irrespective of the atmospheric conditions at the time the tests are performed. Tests have been performed on a core binder with the relative humidity reading at 85. Cores were just as strong at this time as when the humidity was at 30.

Another advantage of this procedure is that it removes the limitations of chemical specifications of core binders. The stand is taken that the way to foster research and improvement in core binders is to promote specifications which are mutually satisfactory to both producer and buyer. That can be done by setting up standards which fit the particular foundry involved.

Summarizing the important additions of knowledge which have been added to the fund of information are as follows:

Use an oven which provides for

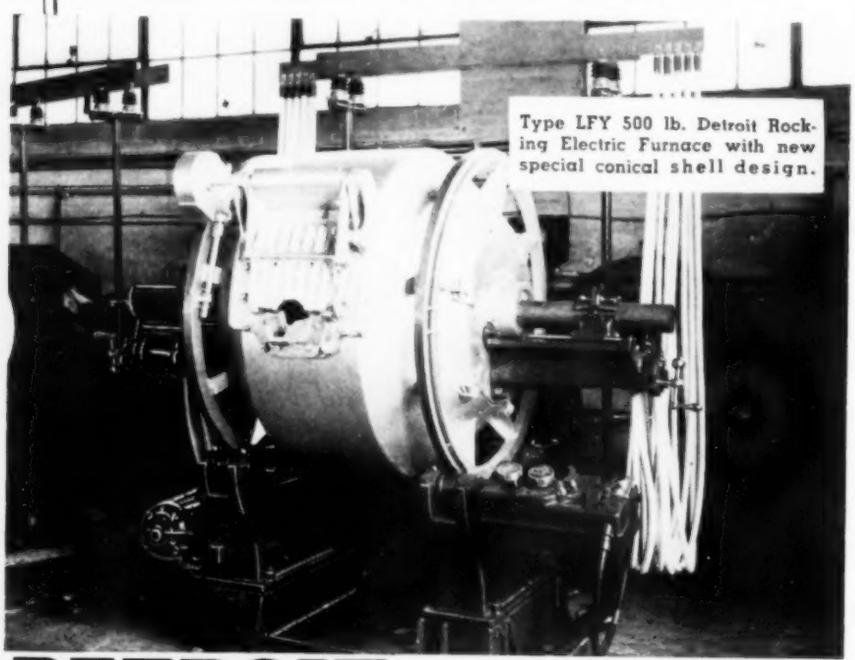
We want another!

say 9 out of 10 foundries after installing their first Detroit Electric Furnace

Alert foundries are more and more turning to Detroit Furnaces for speedy, accurate melting to obtain maximum quality at low cost. Their order for one usually is a signal for more. Here's why: Detroit Furnaces offer you:

1) Fast melting, 2) Precise metallurgical control, 3) Low metal and alloy losses, 4) Adaptability for ferrous or non-ferrous melting, 5) Unexcelled economy of operation, 6) Simplicity and ease of control.

You, too, will find that it pays to install a Detroit Rocking Electric Furnace. Write for the new 24 page catalog.



Type LFY 500 lb. Detroit Rocking Electric Furnace with new special conical shell design.

DETROIT ROCKING ELECTRIC FURNACE

Division of Kuhlman Electric Company • Bay City, Michigan

nearly constant and uniform temperatures within it.

Cool the cores in a desiccator to prevent water absorption.

Test the cores at a standard temperature of say 100 degrees Fahr.

Also, test the cores at 250 degrees Fahr., or whatever temperature corresponds to the particular foundry practice used in the grinding and handling of hot cores, in order to gain knowledge of the hot strength of the cores.

Determine separately the loss of strength of the cores due to moisture absorption.

Determine the amount of core gas given off by the test cores after baking.

To the previously mentioned specifications it should be added that the purchaser has the right to determine the workability of the core binding material by actual foundry tests. It has been found that some binding materials may pass the previously discussed specifications and still cannot be used in 100 per cent of the jobs in a core room. It may stick in the core boxes, or it may not blow evenly in the core boxes.

Considers Method Reliable

Nevertheless, it is felt that even with such limitations to the specifications, the method of testing core binders described is more reliable than to judge a binder with chemical specifications. A supporter of chemical specifications might argue that the method given would permit the use of fish oil in the compounding of the binding material. That may be answered by stating that today it is possible to completely deodorize fish oil by chemical treatment so that it cannot be detected by such tests as saponification values, iodine values, and acid values. The finished deodorized fish oil will possess practically the same chemical specifications as raw linseed oil, and of course, defeat the specifications in this manner.

Another bad feature of most chemical specifications is that they set up saponification values and iodine values which make it impossible for the manufacturer of core binding materials to use any other vegetable oils other than linseed oil, china wood oil, perrilla oil, fish oil, and possibly oticica and hempseed oil. Such vegetable oils as soy bean oil, etc., are excluded because they have low iodine values; yet, they produce very good cores.

It, therefore, follows that the adoption of the generally accepted chemical specifications prevent research and advancement in the manufacture of core binding materials because they automatically make it impossible to use anything but certain ingredients.

Producing Nickel Silver Castings

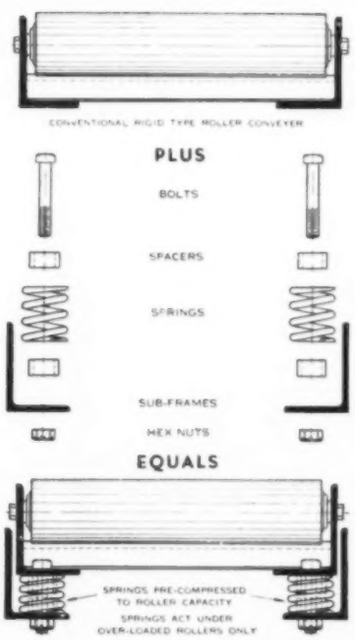
(*Continued from page* 47)

reasons. First, they are rapid melters and can bring down a 150-pound heat in about 1 hour with the consequent benefit of short exposure of the metal to furnace gases. Second, they can be operated easily to give a slightly oxidizing atmosphere, containing from 0.2 to 0.8 per cent free oxygen, which is a further safeguard against the absorption of gases such as hydrogen.

Oxygen content of all furnace gases should be checked. If the furnace has an exhaust flue connected to a stack or chimney, the flame of course cannot be observed and the exhaust gases should be analyzed for oxygen content at any particular setting of the oil or blast valves. Once a satisfactory setting has been determined this normally should not require modification unless a drastic change is made in the type of oil used or a defect develops in the air supply. Warning of the latter trouble can be obtained by fitting a gage.

Fuel oil used preferably should contain not over 0.5 to 1.0 per cent

MATHEWS SPRING MOUNTED CONVEYERS



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THE principle is simple; the roller axles are rigidly locked in the frame as in the conventional "rigid type" construction, but the conveyer frame which retains the rollers is carried on pre-compressed coil springs. The springs are held in compression equal to the rated safe load of each roller. Under impact conditions or excessive loads the springs absorb the overload.

This construction represents the greatest improvement in roller conveyer in many years. Its application will reduce maintenance costs by prolonging the life of the equipment. When conditions are severe, "spring mounted" is the practical conveyer construction for the job.

Capacities from 150 lbs. to 8000 lbs. per roller available.

Ask for Illustrated Folder

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104 TENTH STREET, ELLWOOD CITY, PENNA.

CONTINUOUS FLOW PRINCIPLE OF HANDLING MATERIALS

sulphur in view of the tendency for nickel silver to pick up sulphur, but this can be counteracted largely by the use of a suitable flux such as manganese ore which has little effect upon the life of the crucible. The crucibles usually employed are of the ordinary plumbago type and it is an advantage to use the high conductivity grade. In many foundries economical results are being obtained by using a crucible for a certain number of nickel silver heats and then transferring it to bronze or yellow brass.

As well as oil-fired pit type crucible furnaces the larger type or tilting furnace also can be used if necessary, but it suffers from several practical disadvantages not present in the former. For example, due to the larger capacity the melting times are prolonged and there is less control over the distribution of the metal when it is ready for casting. The majority of articles made in nickel silver are relatively small and must be cast over a narrow temperature range to obtain best results. This cannot be arranged readily with large metal quantities in the average brass foundry. For most applications the average pit type furnace taking crucibles from 50 to 150 pounds is hard to beat for general performance and it also has the advantage of being particularly suitable to foundry production methods.

Modern forced-draft coke-fired crucible furnaces are suitable for melting nickel silver and are cheap in operation. They are fast melters and providing the air supply is adequate, little difficulty will be experienced in obtaining the necessary slightly oxidizing furnace atmosphere. However, it is advisable to check that by analysis wherever possible, and also to have a blast gage installed for control purposes.

A good quality of cut and graded hard furnace coke should be used containing under 10 per cent ash and not more than 1 per cent sulphur. Most of the coke manufacturers now are supplying furnace coke cut and graded to meet nonferrous crucible melting furnace requirements. This is of considerable advantage in obtaining uniform conditions ensuring proper packing of the melting space and longer periods of firing with consequent rapid melting of the charge. A coke size of between $1\frac{1}{4}$ and $2\frac{1}{4}$ inches meets most practical conditions. It is important to use the best hard coke for melting as the softer grades burn much too rapidly, and prevent attainment of satisfactory conditions.

Place Charge in Pot

In melting nickel silver in the forced draft, coke-fired furnace it is advisable to ensure that the bulk of the charge is contained in the pot at the start of firing by using, if necessary, a superheater top or other extension to the crucible. That facilitates rapid melting and also prevents the admixture of particles of coke with the consequent risk of carbon absorption. It also is advisable to use a cover on the crucible; a bottom cut from an old pot being very serviceable.

Natural-draft, coke-fired furnaces are not nearly so satisfactory as the previous types for melting nickel silver as they are much slower and usually give a neutral or reducing atmosphere resulting in the danger of pick-up of hydrogen, carbon and sulphur. Since however, they are employed by the many nonferrous foundries certain necessary modifications in practice should be considered.

As a melting time not exceeding 1-hour is more or less essential to obtain the best results, the fastest melting fire should be selected for nickel silver heats, and this in most cases will be that nearest to the stack. Do not use too large a crucible and take care that there is ample coke space in the furnace to avoid the necessity for frequent renewal of fuel. If necessary the nor-

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Try it! Press this button. Press it only slightly at first and watch your load begin to move very slowly. It creeps at a snail's pace, enabling you to "inch" it exactly where you want it without jolting or jarring.

Now, press in the button a little farther. The load moves faster and faster, from standstill to maximum speed . . . speed of movement is controlled entirely by pressure on the button.

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mal crucible charge can be reduced to obtain the required melting speed. Intelligent application of these suggestions will, in most cases, provide rapid melting conditions.

The question of correct furnace atmosphere is not solved so easily. Few natural draft furnaces give an atmosphere containing a slight amount of free oxygen and use of an oxidizing flux becomes almost essential. Manganese ore, manganese-dioxide or black copper oxide all envolve a slight amount of oxygen at temperatures over 1832 degrees Fahr., and these are of great help in obtaining proper melting conditions with this type of furnace.

Manganese ore is to be preferred in view of its additional desulphurizing action and low cost, about 3 to 5 per cent of the metal charge weight being employed. To maintain the oxidizing atmosphere on top of the metal it is important to use a covered crucible in conjunction with a superheater as outlined in the case of forced draft units. Manganese ore should be placed in the bottom of the crucible before charging the metal.

Melting Loses Are High

Electric melting has so far not been applied to any appreciable extent for the melting of nickel silver for normal foundry purposes. Melting losses with the arc furnace tend to be excessive and there is some difficulty in obtaining the correct furnace atmosphere. Furthermore, it does not lend itself to average production routine. Induction furnaces are useful where the metal is to be made continuously, but this is again not common to normal foundry practice. Gas-fired crucible furnaces can be used if the price of this fuel permits.

Nickel silver castings can be made from two types of raw material: (1) Virgin metals. (Pure nickel squares, best selected copper ingots, tin, lead and zinc, with or without returned scrap from previous melts.) (2) Prepared casting ingots of definite composition with or without returned scrap from previous melts. For those foundries not having metallurgical control the use of prepared casting ingots together with 30 to 70 per cent of returned scrap from previous melts is recommended strongly.

Where light castings are to be made, small-sized crucibles should be selected as far as possible, so that adequate control over pouring conditions can be maintained. Nickel silver should be poured relatively hot. If a large crucible is used to cast a great number of molds the temperature drop between the beginning and end of pouring is outside the range essential for obtaining satisfactory results.

A few foundries successfully are producing nickel silver castings for both ornamental and pressure-resisting purposes without conducting any deoxidation treatment whatsoever, but they are the exception rather than the rule. At first sight it might be thought that the zinc in the alloy would act as a natural deoxidizer and this is partially true under certain conditions of composition and melting procedure. However, in the majority of cases, deoxidation is a necessary precaution for obtaining most economical results.

In deoxidizing melts the manganese should be bound to the bottom of a steel rod with copper wire, and plunged to the bottom of the crucible at least five minutes before drawing from the furnace. The magnesium addition should be similarly made immediately before drawing the crucible. Phosphor-copper is added immediately before pouring and after the protective slag has been removed.

The latter addition can be omitted if desired, but it sometimes is useful in clearing up the surface of the melt and facilitates pouring. The whole deoxidation treatment as recommended has been found to work well on 150-pound heats made

Stearns Pioneered COOL the Magnetic Pulley

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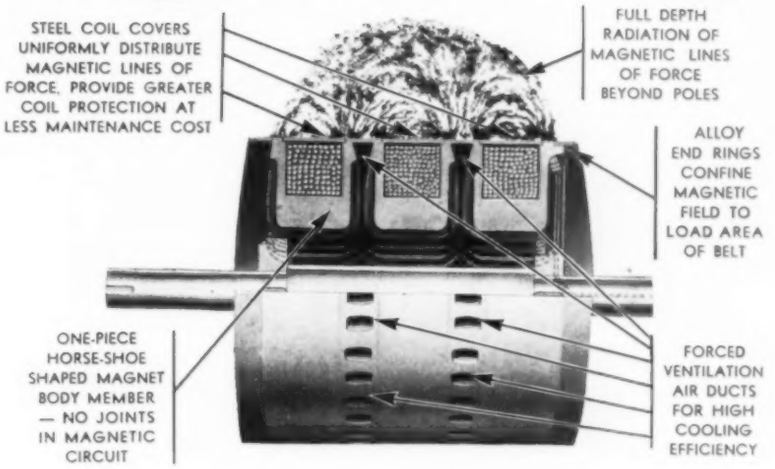
STEEL COIL COVERS UNIFORMLY DISTRIBUTE MAGNETIC LINES OF FORCE, PROVIDE GREATER COIL PROTECTION AT LESS MAINTENANCE COST
FULL DEPTH RADIATION OF MAGNETIC LINES OF FORCE BEYOND POLES
ALLOY END RINGS CONFINE MAGNETIC FIELD TO LOAD AREA OF BELT
ONE-PIECE HORSE-SHOE SHAPED MAGNET BODY MEMBER — NO JOINTS IN MAGNETIC CIRCUIT
FORCED VENTILATION AIR DUCTS FOR HIGH COOLING EFFICIENCY

Just a few of the many distinctive and exclusive features that make the STEARNS Magnetic Pulley the outstanding value today. With this pioneer designing comes highest quality material, exacting fabrication and exhaustive tests. The wide acceptance of STEARNS Magnetic Pulleys, prestige earned in satisfactory service for outstanding companies everywhere, is the result of progressive better engineering. STEARNS gives most for the dollar.

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MAGNETIC MFG. CO.

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in an oil-fired crucible pit furnace from virgin metals; pressure-tight castings being readily secured on rather difficult patterns.

When prepared ingot is used or a considerable portion of the charge is composed of returned scrap, a simple deoxidation with either manganese or magnesium probably will suffice. Deoxidizers other than those stated, particularly silicon, should not be used as additions to nickel silver.

Before drawing the crucible from the furnace the metal should be superheated amply to at least 2550 degrees Fahr. and should be evolving zinc fume freely. Immediately after drawing, the slag should be thickened if necessary by the addition of dry sand, well skimmed from the opposite side to pouring lip, and the metal poured hot into the molds. Correct pouring temperature depends upon the size, section and composition of the castings being produced.

Generally speaking, the temperature employed for ordinary cocks and taps will vary from 2250 to 2450 degrees Fahr. but little trouble will be experienced if one casts, within reason, as hot as possible. In the case of test-bars for inspection purposes it is advisable to find the most suitable casting temperature by experiment.

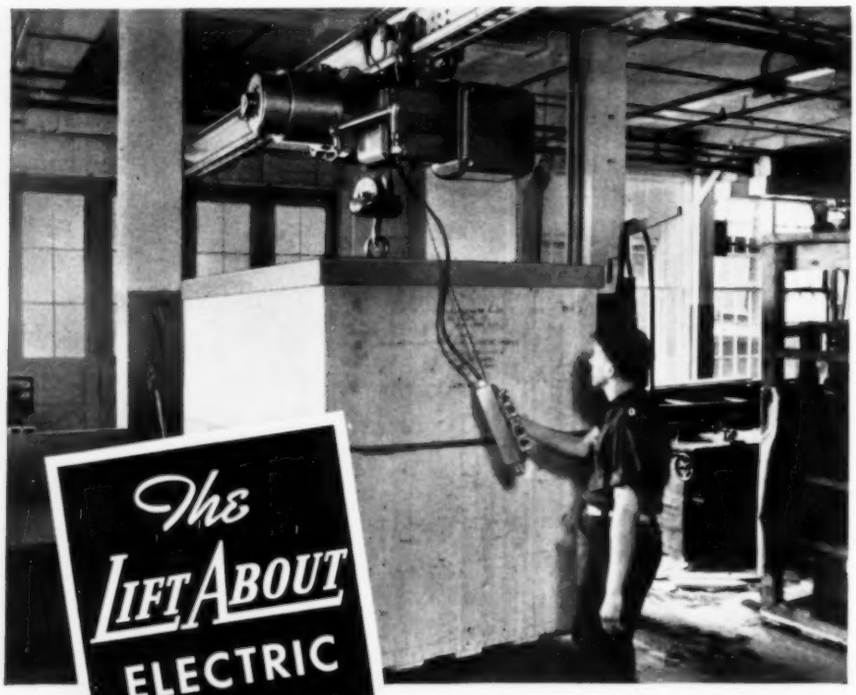
The gate should be choked as quickly as possible on starting to pour and kept full throughout the entire pouring operation, filling the molds fairly rapidly. In general, horizontal pouring is preferable for most work. Appearance of the top of the runner or risers gives a good indication as to whether melting and feeding have been satisfactorily conducted and they should show a pronounced shrink. If the metal rises in the runner at, or just prior to, solidification it can be assumed that melting or deoxidation practice has been defective and the castings will be porous.

In molding there is no general rule to be followed as every pattern is a problem in itself. Nickel silver has a shrinkage of around 3/16-inch to the foot, which is similar to that obtained on cast yellow brasses and bronzes used for plumbing fixtures, valves, taps, etc. Therefore it can be anticipated that in many cases well designed pattern plates as used for casting brasses and bronzes can be turned over to nickel silver without much alteration, providing the runner can be choked during pouring. However, it is a wise precaution to keep runners and risers of ample proportions, particularly so far as the larger and uneven sectioned castings are concerned.

Feed with Hot Metal

In general, risers should be placed so that they will be filled with the hottest metal at the end of the pour and nickel silver should not be expected to run a pattern plate containing quite so many pieces per gate as commonly used for the more fluid bronzes. In view of the higher temperatures involved nickel silver has greater chilling tendencies and cannot run certain molds as well as the lower melting alloys. Molds should be filled rapidly without excessive turbulence. In practice, possibly the best course to adopt is to work at first by trial and error methods, making the necessary alterations as and when required, according to results obtained.

In view of the high casting temperatures employed it is important to use refractory and permeable sands. Small nickel silver castings can be made readily in green sand using the natural sands of the group of Albany used for brass foundry purposes. Some of these sands are supplied in various grades of texture and the finest grades should be avoided. This particularly applies to those sands of 00 and 0 grades. Dusting the mold with flour helps in obtaining fine finish, and skin drying is an advantage.



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Shepard Track (Patented)

UNWIELDY LOADS ARE HANDLED WITH EASE BY A SHEPARD NILES LIFTABOUT ● One hand does the lifting, no matter how clumsy the load, when a LiftAbout acts as a helper. Up a fraction of an inch, or the full height of lift—along the runway a few feet or the entire length and breadth of the plant—every motion under perfect control of the operator. There are numerous places in every plant where these untiring helpers should be helping to cut load handling costs.

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A COMPLETE LINE OF CRANES & HOISTS

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Core practice on nickel silver should follow the lines of ordinary bronze practice and no special suggestions are required. Oil sands are used quite frequently for mass production purposes and usually are made from sea sand, to which a certain amount of fine silica or red sand has been added to give the necessary finish in conjunction with one or other of the many organic binders on the market. In most cases the cores should be soft and collapsible, especially on work where the cores are large and the metal sections light. Not infrequently trouble has been caused by the resistance to shrinkage which is imposed on the metal during solidification and cooling by too hard cores. Care should be taken to ensure adequate permeability.

If the main points outlined are followed little bother should be experienced from unsound castings. An intelligent foundryman is quite capable of dealing with the more obvious troubles which may arise, but there is one defect which may puzzle the practical worker, namely unsoundness. That takes the form of numerous small bright blow-holes disclosed as soon as the skin is broken during machining or polishing and is due to improper melting or incomplete deoxidation treatment.

Metal Absorbs Gas

If a reducing atmosphere is employed and melting is prolonged, the metal absorbs both hydrogen and carbon to a variable extent. On cooling the metal gives off hydrogen and this can contribute to the formation of this defect. An alternative cause is due to the fact that in certain circumstances carbon will react with oxides to form carbon monoxide, a gas which is very scluble in molten nickel-containing nonferrous alloys, but which is much less soluble in the solidifying metal.

The result is that the gas is liberated on solidification and causes the bright blow-holes and porosity in conjunction with the rise of metal in the runner. Remedy is to melt under oxidizing conditions followed by adequate deoxidation treatment.

Sand which is too damp, or molds which are impermeable also will cause blow-holes. In such cases the metal will blow as soon as it enters the mold, but this disturbance, as a rule, has little effect on the observable shrinkage shown on top of the runners and risers. If, on the other hand, the blow-holes are due to gas evolution from the metal itself no violent disturbance occurs and the metal rises slowly and gradually during solidification.

The following summarizes the main points which should be borne in mind in order to ensure sound castings in nickel silver:

1. Use raw material of adequate purity and appropriate composition.
2. Melt rapidly under slightly oxidizing conditions.
3. Use glass as a cover. Do not use charcoal.
4. Deoxidize properly.
5. Pour at sufficiently high temperature.
6. Fill molds rapidly with minimum turbulence.
7. Use ample and properly placed gates and risers.
8. Use open sand and vent molds thoroughly.
9. Use moderately soft cores which collapse readily.

This article is from a paper presented by the author at the Chicago Regional conference held last November at the Museum of Science and Industry, Chicago.

Bethlehem Steel Co., Bethlehem, Pa., is preparing an industrial motion picture on the making and use of wire rope. The new picture, "Sinews of Steel," will begin with the handling of iron ore and will show the principal operations in steel making.

New PARCLONE Dust COLLECTOR

. . . NO CLOTH!

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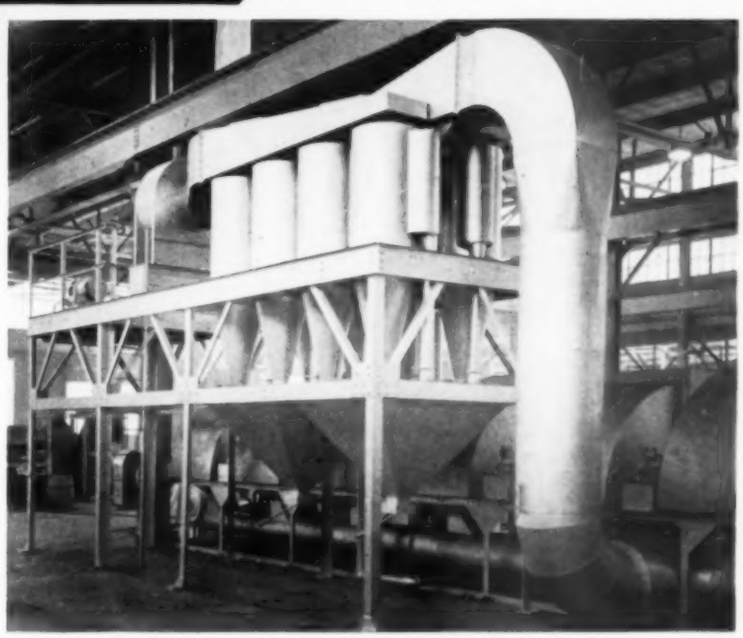

● THIS FIELD-TESTED PARCLONE CENTRIFUGAL DUST COLLECTOR ELIMINATES DUST FROM SHAKEOUTS AND SAND-HANDLING SYSTEMS

It uses no filters—no water, and is low in installation cost. Maintenance is nil.

This is not an old-fashioned cyclone collector but a unit whose collection efficiency runs from 92% to 98%.

Temperature and moisture problems are readily solved by this type of installation.

Write for Bulletin.

OTHER PARSONS PRODUCTS:

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PARSONS ENGINEERING CORPORATION
CLEVELAND, OHIO

METALS ABSORB GAS

(*Concluded from page 48*)

inating the discolored fracture in the casting caused by the passage of the gases to the riser. The casting itself is not fully up to the highest standard for the composition due to the presence of dissolved gases in suspension in the molten metal.

There is no cure for gassed metal except to pour it into ingots. The process of solidification in the ingot drives off the gases. The ingots are remelted in a proper furnace atmosphere where gas absorption will not occur. No means of treating the metal by the addition of flux or reagent will cure the condition brought about by the melting of metal in an improper furnace atmosphere.

Some foundrymen claim that the addition of an oxidizing medium will correct the evil. It may reduce the evil, but as for curing, the only cure is found in maintaining a furnace atmosphere free or nearly free from underburnt gases. Increase in the speed of melting will result from increase in temperature derived from complete combustion of all the gases in the fuel. Increase in temperature reduces the melting time. Reduction of melting time means reduction in the time during which the metal is exposed to even a small amount of soluble gases that may be found in this nearly perfect furnace atmosphere.

Absolutely perfect furnace atmosphere is almost impossible to be obtained. Eddies in the flow of the gases in the furnace retard the proper mixture of the fuel gases with the air. Furnaces sometimes are clogged. Unknown to the furnace operator obstructions develop peculiar conditions that may result in momentary baffling of the gases so as to distort their mixing with each other to an ideal state. A perfect mixture of fuel gases with the full amount of oxygen must have a high enough temperature to insure complete combustion.

Many variables enter into the successful burning of all gases in a fuel fired furnace. An operator must devote most careful attention to this process and see that conditions are as near perfect as possible; that all obstructions are removed from the furnace, the flue and the burner orifice. Direction of flow from burner to furnace must be maintained at ideal position. The metal to be charged into the furnace must not be preheated in such localities as will permit of the metal absorbing underburnt gases during the warming up process.

. . . that offer uniform cores, greater production, lower costs?

THERE'S the *new* electrically operated lift door . . . *new* safety door latches . . . *new* smokeless doors . . . the *improved* Maehler Heater . . . *new* time and temperature control over the baking cycle . . . and the combination oil and gas burner!

If you saw these features at the show you realize their advantages . . . if you haven't seen them, write today for all the details. Mister, your core baking problems are over! THE PAUL MAEHLER COMPANY, 2200 W. Lake Street, Chicago, Ill.

A.S.T.M. Will Meet At Atlantic City

Forty-third annual meeting of the American Society for Testing Materials will be held at Chalfonte-Haddon hall, Atlantic City, N. J. during June 24 to 28. Twenty-two separate sessions are being arranged with several symposiums and certain groups of technical papers indicating widespread interest. Important sessions will include a symposium of tools of analytical chemistry, symposium on significance of the tension test in relation to design, symposium on spectrochemical analysis, and symposium on radiographic testing.

Trade associations section of the National bureau of foreign and domestic commerce is preparing a trade association directory which will provide a guide to the 11,000 national, interstate, state and local business organizations throughout the United States.

PRODUCES STEEL CASTINGS

(*Concluded from page* 45)

moves all sand and scale even in corners and deep pockets. Ease in handling is claimed as one of the main advantages of the present system. Castings are placed in a loading hopper holding approximately 4000 pounds. Complete cleaning cycle from loading to unloading averages 15 minutes per load, or a gross weight of 16,000 pounds cleaned per hour. The 15-minute cycle includes 11 minutes actual cleaning time.

Additional equipment recently installed in the cleaning department includes roller conveyors and an overhead monorail system. With this change, all small floor castings are run through a sprue cutter before being cleaned in the airless barrel. The object in cutting the sprues from the castings is not to relieve the acetylene operators, but merely to reduce the unnecessary gross weight which has to be cleaned in the barrel.

Reduce Tumbling Time

Before putting the sprue cutting operation into effect, the barrel operated from 7 to 8 hours per day with 48 per cent of the load consisting of heads and gates. The same net weight of castings now is cleaned in 4½ to 5 hours. This simple operation of removing the sprues also reduces the operating and maintenance costs and permits an increase in tonnage through the machine in an 8-hour cycle at the expense of an additional laborer and slight maintenance expense for the sprue cutter.

Delivery of thoroughly cleaned castings to the cutter's bench permits the operator to cut closer to the casting proper, and also produces a finer and more controllable cut, thereby reducing the cost of cutting time and the cost of oxygen and acetylene. With the possibility of closer cutting being done on the casting, the snag grinders have less metal to remove, which in turn decreases grinding cost and the grinding wheel expense. It might be added at this point that castings which are cleaned in the airless barrel are not peened or sharp corners rounded.

Requiring the cutters to act as rough inspectors eliminates the possibility of obviously nonsalvagable castings from progressing too far into the cleaning process before they are scrapped. This item alone saves a considerable amount of money in eliminating unnecessary work formerly done in the tumbling barrels. After the snag grinding, the castings pass to the rough chippers, finish chippers and then the small wheel grinders. Each operator does his share in preparing the castings for final inspection.

Castings arriving at the inspector's conveyor are ground thoroughly, chipped and cleaned. The entire surface, every corner and crevice, are visible because of the clean condition. Thus 98 per cent of the work on the castings is done before they are annealed, thereby eliminating reworking after annealing, which in many instances necessitates the costly operation of reannealing and blasting. After the annealing operation the castings are transported to a second barrel in the system where any annealing scale is removed. They then are routed through final inspection and sent to the shipping department.

Atlantic Abrasive Corp., South Braintree, Mass., recently has been organized to manufacture a special line of grinding wheels, including plain and combination wheels in a full range of sizes and grits for a variety of jobs.

CORE MAKING economies follow quickly when you use durable lightweight core plates! They provide the savings that come with long, efficient service . . . the increased production that comes with easier handling.

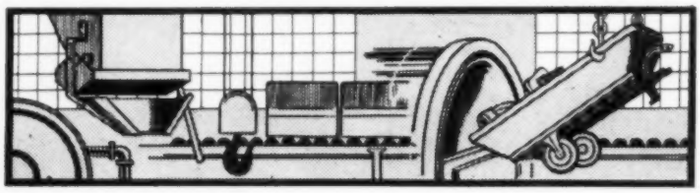
Made of a specially treated combination of asbestos and cement, J-M Transite Core Plates are inherently durable . . . offer maximum resistance to cracking and breaking . . . are permanently free from corrosion . . . and there is little, if any, warping.

Yet, this is only half the story on Transite's contribution to lower core making costs . . .

Equally important is the fact that Transite Core Plates weigh only about a quarter as much as metal of equal thickness. Core makers actually carry *twice as many* with considerably less effort! Result . . . up goes production capacity . . . down go core making costs. For complete details, send for our free brochure. Write Johns-Manville, 22 E. 40th Street, New York City.

Johns-Manville
TRANSITE CORE PLATES
JM

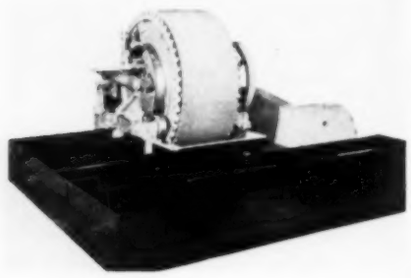
NEW EQUIPMENT



AND SUPPLIES

Metal Reclaimer

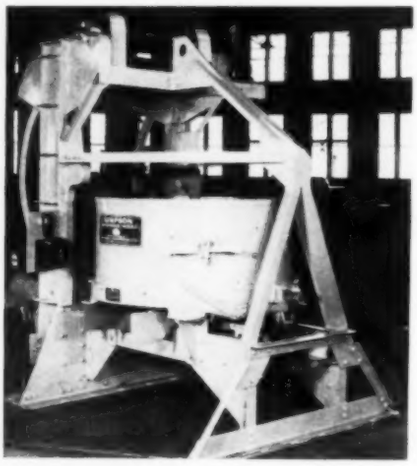
Dreisbach Engineering Corp., Yonkers, N. Y., has developed a new design, metal reclaiming mill shown in the accompanying illustration. It



is designed for the recovery of nonferrous metallics from ashes and cinders, skimmings, old furnace linings and crucibles, etc. The device is the free grinding, crushing roll type and all material is ground above the center or water level. Feed to the mill is continuous until the drum contains a full charge of metal. Metal is discharged from the drum by shifting a hand lever which drops the charging hopper. Refuse tailings are retained in the settling tank as the water recirculates through the mill. Crushing rolls are made of manganese cast steel, and the mill is made in several sizes of various capacities.

Sand Mixer

National Engineering Co., 549 West Washington boulevard, Chicago, recently has added a portable type 4 foot 6-inch diameter intensive mixer with straight lift bucket loader to its extensive line of sand mixing equipment. The first unit of the new design, shown in the accompanying illustration, has been set up in a prominent Pennsylvania plant engaged in the production of heavy machinery. The unit is designed to be picked up by the crane and moved when necessary from one part of the foundry to another. It requires only a reasonably level floor on which to operate. The device is controlled entirely by push buttons and is simple and compact. The mixer has a capacity of approximately 600 pounds of sand per batch. The bucket loader permits one batch to be made ready while the preceding bath is being mixed. Similar units with and



without bucket loaders are available in 3, 4, 4½ and 6 foot sizes.

Pattern Plates

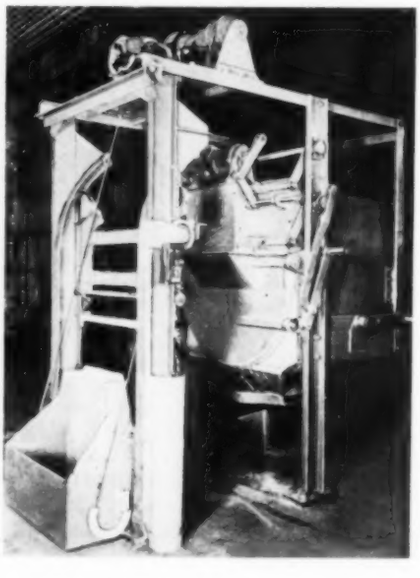
Scientific Cast Products Corp., 1390 East Fortieth street, Cleveland, and 505 South Western avenue, Chicago, is producing pressure cast aluminum patterns and pattern plates for which many advantages are claimed. The plates are cast in plaster molds under pressure which, it is claimed, provides accuracy of pattern duplication, sharp and accurate partings, freedom from center shrinks or shrinks at heavy sections. It also is claimed they have a high natural finish reducing the hand work generally necessary.

The method is applicable to single pattern plates but the claim for economy is particularly well sustained in the production of plates with a great number of small patterns. Only one master pattern or partial gate is required. Partings are determined accurately and modeled in clay. Then enough small plaster composition molds are made to complete the number of patterns wanted on the plate. The several molds are trimmed to size, placed on a true surface plate in the desired arrangement and bound together with the same plaster composition in precision machined frames. Molds are dried thoroughly in moderate ovens for periods ranging from 12 to 24 hours. Small cast chills in the molds also greatly assist in eliminating shrinks. The molds are clamped in the shooting blocks which consist of two surface plates. A metal holding well is clamped to the cope surface plate. After the well is filled with metal it is sealed and air pressure applied to force the metal in to the plaster mold. Facilities are available for casting plates up to 41 x 49 inches.

Water Blast

Whiting Corp., Harvey, Ill., recently has placed on the market a casting cleaning unit, shown in the accompanying illustration, in which the castings in a tumbling barrel are cleaned by a stream of sand

(*Continued on page* 132)



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Experienced Foundrymen from our Technical Service Department are ready to serve you.

KORDEK

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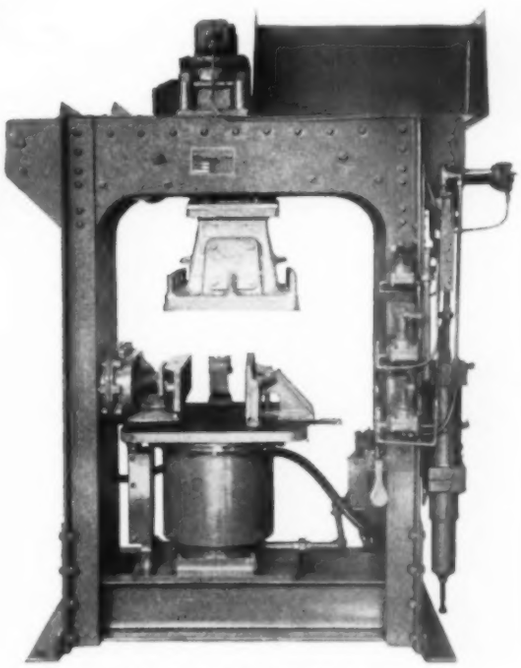
17 BATTERY PLACE • NEW YORK CITY

New . . . **DEMMLER**

CORE BLOWERS

No. 0 Core Blowing Machine

We have a size and style for every job. Our representatives will be glad to discuss your requirements.



No. 3E Core Blowing Machine

WM. DEMMLER & BROS.

KEWANEE
ILLINOIS

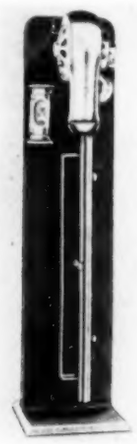
(*Continued from page* 130)

and water delivered at a pressure of 1200 pounds per square inch and at a velocity of 18,000 feet per minute at the nozzle.

The perforated heavy steel plate barrel with rubber sealed door is rotated by electric motor at speeds varying from ½ to 3 revolutions per minute. A motor operated oscillating nozzle plays the stream of sand and water on all parts of the castings during the tumbling operation. Water is provided by a high pressure pump and the sand is ordinary foundry sand taken from the cleaned castings and used repeatedly. Water is not recirculated. Clean water is taken from the city mains. Sand and water are united for maximum efficiency in a special gun. Castings brought by wheel barrow or tote box are dumped into the loading bucket. Average load for a 36 x 42-inch barrel is 600 pounds. An electric hoist raises the load and dumps it into the barrel. Blasting period ranges from 5 to 10 minutes. At the close of the blasting period the sand is shut off and the castings are rinsed with clean water. If necessary an inhibitor solution is turned on for 20 seconds to prevent the castings from rusting. Motion of the barrel is reversed to discharge the cleaned castings into a waiting receptacle.

Film Dryer

Harry W. Dietert Co., 9330A Roselawn avenue, Detroit, is marketing a dryer for rapidly drying photographic plates or films as used in metallographic and spectrographic laboratories. It is claimed a film or plate may be dried in 2



minutes, thus avoiding the usual half hour wait before the information on the film or plate may be interpreted and put to use. In a sturdily constructed electric motor driven blower the air is heated to a predetermined temperature by an electric heater. The film or plate is held vertically in the dryer and dried rapidly by the high velocity heated air current sweeping past the surface.

Core Drawer

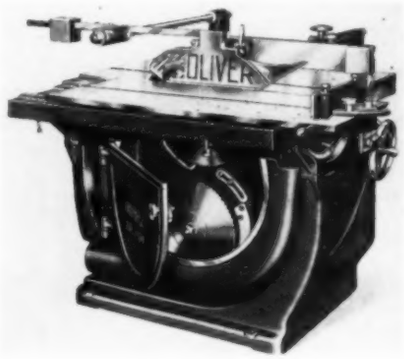
Manufactured by the Ross Pattern & Foundry Engineering Co., Sidney, O., and distributed by the Freeman Supply Co., Toledo, O., the corebox drawing machine, shown in the accompanying illustration, is designed for use in production and jobbing foundries on all types of bench work. The machine is avail-

able in two types for one or two coremakers. The grooved vertical plate, against which the corebox is drawn, is adjustable, mounted in rubber and vibrated by air or electric vibrator controlled by a quick acting knee valve mounted on the front of the machine. The device eliminates the necessity of any special skill or training.

Special corebox equipment is not required since existing coreboxes readily may be adapted for use. In many instances the operator's fingers serve as drawing guides in the vertical grooves on the plate. For deep and intricate draws a pin or bar of ⅜-inch half round stock is fastened to the side or end of the corebox. It is claimed that with this machine deep and difficult draws can be made without distorting the cores, cores will come true to boxes and all hand rapping is eliminated with consequent reduction of damages to boxes and pins. Coreboxes can be used one at a time, or 5 or 6 may be stacked on the rubber insulated bed which is not affected by vibration of the back plate. Machine requires floor space 20 x 28 inches.

Saw Bench

Oliver Machinery Co., Grand Rapids, Mich., has introduced a double arbor universal saw, shown in the accompanying illustration. This is a direct motor driven machine with a shaftless motor built in directly on each of two ball bearing saw arbors. It is claimed that this arrangement assures economy, safety,



convenience and ease of operation and maintenance. Ripping and cross cutting may be done on the machine without changing saws, simply by turning a hand wheel. A partition divides the substantial cast iron base on the inside, separates the rotating mechanism from the saws and directs the saw dust into a built-in dust chute.

The base is 30 x 37 inches and 32 inches high with a table 41½ x 44½ inches. An extension bracket 12 x 16½ inches on the stationary side receives and supports the ripping fence on extra wide stock. Rolling section to the left of the saw rolls on ball bearings with vertical adjustment for alignment and wear. It may be moved 4 inches from the saw for use of dado heads and for applying saws. Stationary section 24 inches wide is graduated entire width in ⅛ inches. Tilting mechanism may be set to any angle up to 45 degree by scale and pointer. The machine is driven by two 5-horsepower motors, 2 or 3 phase, 60 cycle, 220 or 440 volts, 3600 revolutions per minute.

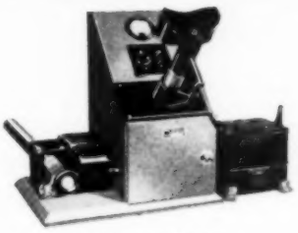
Crane Ladle

Treadwell Construction Co., South Twelfth street, Midland, Pa., recently has introduced a line of worm geared ladles ranging in capacity from 2 to 5 tons. Construction features include a stopper arrangement for pouring clean metal from the bottom of the ladle and a geared turning device designed to prevent movement of the ladle through

(*Continued on page* 134)

HIGH TEMPERATURE TEST

Dilatometer



Sintering Tester

Test your sands at elevated temperatures

SAND LABORATORY

Test Work Solicited

Molding Sands—Core Sands—Silica Sands
Core Oils—Core Binders—Bonding Clays.
Spectrographic Analysis.
A complete laboratory with a practical staff.

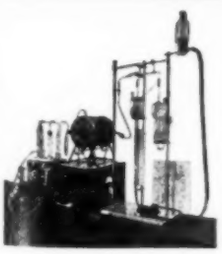
MOLTEN METAL TEMPERATURE

Ferrotemp

Accurate temperature determination of molten iron and nonferrous metals in ladles by immersion pyrometer. Range from room temperature to 3100° F.

Economical in cost and in use. Time required for reading is 50 seconds.

MODERN ANALYSIS



Carbon Determinator

Use cast specimens for carbon and sulphur determinations and save time. This is made practical with our specimen mold.

Accurate carbon determinations made in two minutes with the Carbon Determinator.

Accurate sulphur determinations made in two minutes with the Sulphur Determinator.

Accurate spectrographic analysis of metals in eight minutes.

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QUICK CARBON DETERMINATOR — QUICK SULPHUR DETERMINATOR

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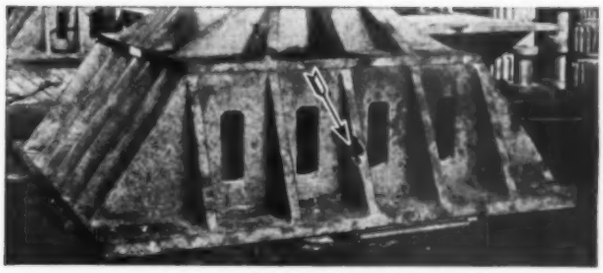


What do YOU do
when sound castings have surface flaws?

When a full-strength casting comes out of the mold with a few harmless surface pits, sand holes or blow holes, you need not choose between the expense of re-casting or the chance of a customer's criticism. Do what other high-grade foundries do—true up the contour with Smooth-On No. 4.

By using Smooth-On No. 4 for such purposes, you maintain your reputation for good appearance as well as quality of castings, and at the same time you protect your profits by reducing your percentage of rejects.

Smooth-On No. 4 is applied like putty, hardens within an hour or two, and when hard, has the color and luster of cast iron. The choice of three compositions enables you to match perfectly the color and grain of the iron or steel casting on which it is used.

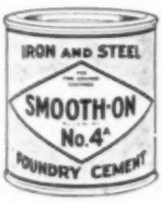
The Smooth-On Handbook tells how to select and use the correct grade of Smooth-On No. 4 for your castings, and also contains concise descriptions with diagrams of dozens of other applications of the different kinds of Smooth-On around the foundry and plant.

Send the coupon for your copy.

Smooth-On No. 4AA. For light gray castings and machined surfaces. Has high metallic lustre and takes a fine machine finish.

Smooth-On No. 4A. For medium gray castings. A fine-grained cement with good metallic lustre.

Smooth-On No. 4B. For dark gray castings. A cement of coarser grain and darker shade.



Smooth-On Nos. 4AA, 4A and 4B is packed in 1-lb. and 5-lb. can, 25-lb. pail or 100-lb. keg. Mail coupon for prices and free hardened samples.

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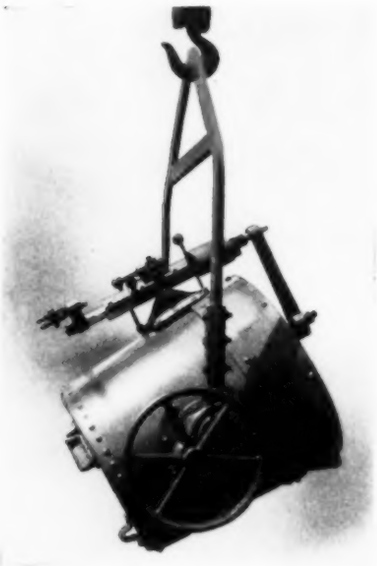
c-40

***Do it with* SMOOTH-ON**

(*Continued from page* 132)

weight of the molten metal.

The self locking turning mechanism is a worm wheel mounted on the ladle trunnion integral with the bail. The gear meshes with a worm of sufficiently low pitch to prevent any



accidental movement of the ladle. The hand wheel is mounted on a cross shaft with suitable gear for operating the worm. Roller type bearings are used and the mechanism is mounted in an oil tight case. The accompanying illustration shows a 4-ton ladle for handling molten steel. It is constructed of $\frac{3}{8}$-inch steel plate, 4 feet high, 4 feet in diameter. Similarly constructed ladles with less gear clearance are available for handling molten tin, lead, babbitt, zinc and other metals.

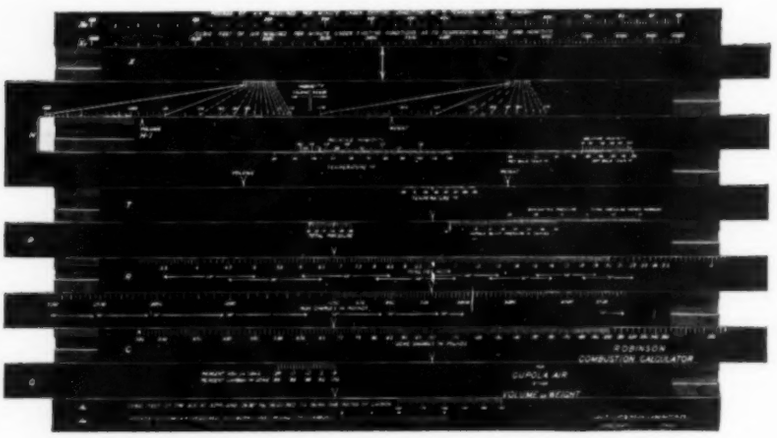
Electric Motor

Howell Electric Motors Co., Howell, Mich., has developed a new type electric motor claimed to be dust, fume and moisture proof, inside an all steel, streamlined housing, as

shown in the accompanying illustration. The new motor in all sizes is built to NEMA frame dimensions interchangeable with motors of the same rating, easily installed to replace open type motors of the same size. It may be operated either horizontally or vertically. Sizes range from $\frac{1}{2}$ to 100 horsepower. An external cooling fan blows air at high velocity directly over the stator laminations to keep the motor cool.

Cupola Calculator

Louis G. Robinson Laboratories, 219 McFarland street, Cincinnati, is marketing a cupola combustion calculator which is shown in the accompanying illustration. The device, according to its maker, supplies in less than one minute data on the cubic feet or pounds of air per minute that the cupola requires under any weather condition, and the pounds of coke required between charges over and above the *basic* coke charge which is that needed to melt the iron at a definite spout temperature when the air is dry. Ordinarily, due to the large number of variables involved, calculations to determine the previously mentioned figures take a long time. Variables include ash in coke, weight of basic coke charge, weight of iron charge, melting rate, barometric pressure, cupola pressure, air temperature, humidity, and equilibrium between CO_2, CO, carbon and iron at temperature and pressure involved. It is claimed that use of the calculator enables the foundryman to secure proper combustion conditions in the cupola, and alleviates many of the troubles due to improper melting.



Excavator

Thew Shovel Co., Lorain, O., has introduced a $1\frac{3}{4}$-yard excavator available with a complete line of interchangeable boom equipment as a shovel, drag line, crane, clamshell and back digger. Outstanding features include simplicity of construction and the ability to concentrate power entirely on one operation, or to spread it over two or three simultaneous and synchronized operations. The unit may be powered by a six cylinder oil engine, a full diesel, a six cylinder gasoline or an electric motor of any standard commercial type to suit specifications. Effective length of the shovel boom is 24 feet 8 inches, equipped with an 18-foot dipper stick.

Burn Treatment

Davis Emergency Equipment Co., 55 Van Dam street, New York, has placed on the market a tannic acid treatment for burns. It is water-soluble jelly containing tannic acid which is claimed to relieve pain, lessen toxic effect, and reduce formation of scar tissue. The material is nonfreezing at temperatures as low as 20 degrees below zero Fahr. It is available in 5-ounce and $1\frac{1}{2}$-ounce tubes, and in unit cartons containing six $\frac{1}{8}$-ounce tubes of the jelly.

Air Filter

Staynew Filter Corp., Rochester, N. Y., has designed a dry type air filter for small engines, compressors, pumps and all types of air breathing machines. The new model is protected against weather conditions by a heavily enameled steel housing opening at the bottom. A radial fin construction is claimed to provide a large filtering area in a small space. The filtering material is a felt like substance of extreme fineness which permits free air flow, yet holds back the smallest particles of air borne matter.

The intake approximately double the outlet area keeps friction and turbulence of the entering air at a minimum. Heavy wire mesh backing of the filter insert adds to the

(*Concluded on page* 136)

CLEANBLAST
SHOT and GRIT

"Cleanblast" alloys are patented.

Cleanblast Shot and Grit are proven quality products made in many grades to satisfy your needs:

Shot produced in 20 sizes.
Grit produced in 14 sizes.

"Cleanblast Alloy 99" is a super blasting shot.

Our engineers will gladly review your blast cleaning operations and make recommendations for further economies.

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Makes cores true to size

ROSS CORE DRAWER
MAKES
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THE MACHINE YOU SAW AT THE FOUNDRY CONVENTION

Draw your cores as you draw your patterns with the aid of vibrators. Eliminates rapping expensive core box equipment. Designed for Jobbing or Production.

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Send for Full Descriptive Pamphlet

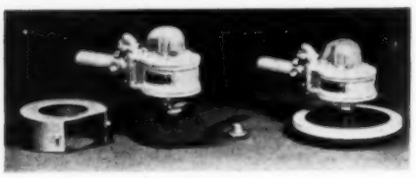
THE FREEMAN SUPPLY COMPANY
Pattern Shop & Foundry Supplies & Equipment—Mahogany and Pine Pattern Lumber
1152 EAST BROADWAY — TOLEDO, OHIO

(*Concluded from page* 134)

rigidity and vibration resistant qualities of the filter. The upper shell may be removed quickly and the insert lifted out for cleaning by unscrewing a wing nut. Upright and hanging models are available in capacities ranging from 3 cubic feet per minute to 225 cubic feet per minute and in a wide variation of standard pipe sizes.

Air Grinders

Rotor Tool Co., 17325 Euclid avenue, Cleveland, claims the following advantages for two new vertical type air grinders: Power of both models has been increased over 40 per cent; maxi-

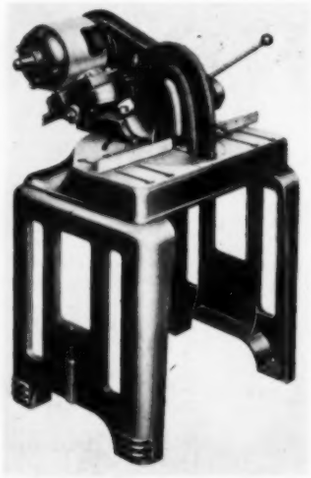


mum power is developed with less than 10 per cent drop in the free speed to give high load speed for fast cutting; one model weighs 10 pounds and the other weighs 12½ pounds; a new balanced multi-port governor controls maximum speed within the limits of the safety code by compressed spring action not affected by variation in air pressure; low maintenance cost.

Welds, castings, etc. are ground with a 6 x 4 x ⅝-inch cup wheel. The tools are used with a 9-inch flexible pad for disk sanding or with 6-inch cup brushes for wire brushing. The manufacturer also claims that the tools are well balanced with the two handles 90 degrees apart and that the large area of contact of the cutting accessories ensures rapid production with ease of operation.

Cutoff Machine

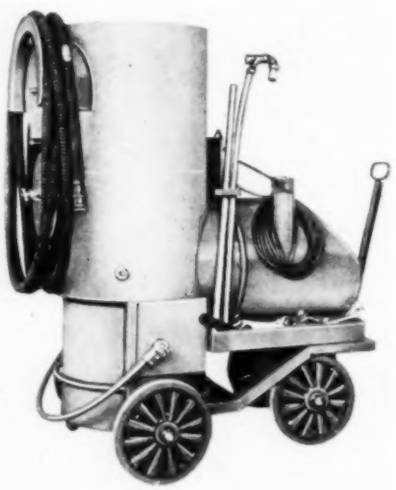
Delta Mfg. Co., Milwaukee, has introduced a new, accurate, speedy abrasive cutoff machine, shown in the accompanying illustration, adapted for cutting metals or practically any other material. On metal it is claimed the cut has a polished surface thus eliminating burring or finishing operations. By changing to a saw blade the unit may be employed in cutting wood. Outstanding features of the rugged machine include wide spaced roller pivot bearings and double arbor sealed bearings requiring no lubrication, powerful *V*-belt drive, adjustable fence and accurately machined table. The machine is balanced for easy operation, cuts material at any angle



and embodies special safety features, husky chip guard, belt and wheel guards. Capacity is up to 2 inches diameter or material up to 2 x 6 inches. It is claimed the machine has a wide range of application in many industries.

Vacuum Cleaner

Spencer Turbine Co., Hartford, Conn., has developed an extra heavy duty portable vacuum cleaner, as shown in the accompanying illustration, with capacity ranging from 5 to 7½ cubic feet of dust. The dirt container only needs a push to put it in place where the self-locating guards hold it until the bar is drawn down to raise the tank from the floor and press it tight up against a rubber gasket to make a seal. The can fits in any position. The standard vacuum producer has a direct connected motor operating at 3450 revolutions



per minute with the impellers mounted directly on the motor shaft. On 25 or 40 cycles, belt drive can be supplied. The separator has seven 8-inch tubular bags with a total filter area of 39 square feet. They are held in place with a spring steel ring and easily removed without the use of any tools. Special features include: Hand shaker inside tank makes it unnecessary to rap each bag separately; two liberal size inspection doors; four 18-inch wheels mounted on roller bearings; pull handle; ring for handling with a crane. Overall dimensions include: Height 81½ inches, width 37½ inches. length 75½ inches. Total weight 1500 pounds.

Combination Tool

Stow Mfg. Co. Inc., Binghamton, N. Y., announces expansion of a line of flexible shaft units to include a combination tool. The new model includes a motor, flexible shaft clamp spindle, and extension cord

and plug. The new model may be used on the bench or as a portable tool. It is fitted with conventional base and a carrying handle. With its compactness and light weight the tool can be operated in close quarters for polishing, grinding, drilling, sanding and filing. Motor offers four choices: ¼-horsepower at 1750; ¼-horsepower at 3400; 1/3-horsepower at 1750 and ½-horsepower at 3400 revolutions per minute.

Air Valve

Chicago Mfg. & Distributing Co., 1928 West Forty-sixth street, Chicago, has added to its line of foundry equipment a new blow gun air valve. It is claimed that only a slight pressure of the thumb against the oil proof rubber nozzle is required to operate the air valve. An exclusive piston principle is said to assure full flow of air. The valve closes on 9 pounds pressure. The device has no buttons to press, no levers to throw and no springs. The valves are available in three sizes, ¼, ⅜ and ½-inch.

Truscon Steel Flask Model OMR-50 designed for one man handling. Flask is barred for special jobs. Eliminates use of gaggers and "tucking."

TRUSCON STEEL FLASKS ARE

Easy to Handle!

• How many tons of unnecessary "flask weight" are handled in YOUR foundry? All excess weight is eliminated in Truscon Steel Flasks. Strength is obtained by design and construction, not by dead weight. • Ribs and flanges of Truscon Steel Flasks extend full depth without buckling or cutting away the metal. Pin lugs and handles are welded or riveted securely as desired. • Every detail is designed to help the molder do better work with less effort.

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Large illustrations of many standard shapes and sizes of Truscon Steel Flasks designed for handling by one man, two men or by power equipment are included in this catalog of information for foundrymen. Send for your copy NOW.

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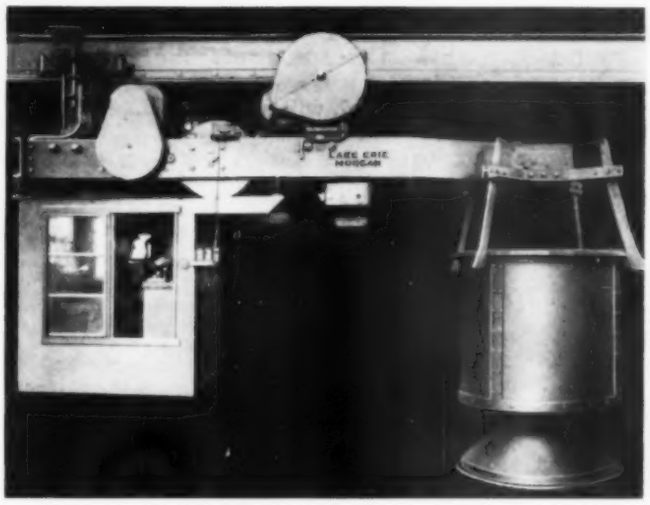
These figures tell the Story of



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This "Before and After" example based on 125 tons per 8 hour day shows how Foundrymen have quickly paid for Lake Erie-Morgan Cupola Chargers by putting Cupola Charging on an economical production basis. Important and repeated savings include lower supervision costs, accurate control of mix, increased output, uniformly better castings and full savings by elimination of crushing and pulverizing coke, correct distribution of charge, low operating and maintenance costs.

"Wheelbarrow" Method

		Per hour	Per day
11 Laborers	@ 47c	$5.17	$41.36
With Lake Erie Morgan Charger			
1 Man in Cab		$.60	
1 Man on Scale Car		.50	
2 Bucket Loaders	@ 47c	.94	$16.32
Daily Savings			$ 25.04
Monthly Savings			626.25
Annual Savings			$7515.00

You can figure it out for yourself how Lake Erie-Morgan Cupola Chargers pay for themselves in twelve to eighteen months . . . write or mail coupon for "The HOW and WHY Of It".

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Please send me illustrated folder showing how Lake Erie-Morgan Cupola Chargers pay for themselves.

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Foundry Activities

STERLING FOUNDRY CO., Wellington, O. has let contracts to Austin Co., Cleveland, for erection of two buildings which will add 7000 feet of space to the present plant, according to R. E. Clisby, president. This expansion coincides with that of the Warner Swasey Co., Cleveland, for which the Sterling foundry makes nearly all their castings.

* * *

Lincoln Brass Works, 2067 Twelfth street, Detroit plans to erect a 105 x 95-foot addition to its plant.

* * *

Grabler Mfg. Co., 6565 Broadway, Cleveland, is building an open crane runway 36 x 120 feet. Edward H. Blywise is president and treasurer.

* * *

Dominion Foundries & Steel Ltd., Depew street, Hamilton, Ont., Canada, has let general contract for a hot mill and foundry addition. Prack & Prack, St. James street South, are architects.

* * *

Peerless Foundry Co., 5648 Vine street, Cincinnati, recently has acquired a group life insurance policy involving a total of $182,000. Approximately 160 employes are eligible to insurance in amounts ranging from $1000 to $3000 each, according to the rank or position they hold.

* * *

Vermont Foundries, Inc., Springfield, Vt., is building a 1-story foundry addition, 100 x 102 feet, costing $40,000 with equipment. General contract to Harty Blaney Construction Co., Boston.

* * *

Schumann Aluminum Foundry, Auburn, Ind., recently has taken over the Garrett Brass & Aluminum Foundry Co., Garrett, Ind. Plant operations started April 22, 1940.

* * *

Superior Castings Co., South Norwalk, Conn., has let contract to Hewlett Construction Co., Norwalk, for the construction of a plant on Meadow street, 74 x 210 feet with wing 20 x 27 feet.

* * *

New foundry has opened in Galva, Ill., in the old Hayes plant. Fred C. Heiden, East Peoria, Ill., L. A. Hagney, East Peoria, and Thomas Spencer, Fairfield, Iowa, comprise the partnership which will operate the foundry.

* * *

Texas Foundries Inc., Lufkin, Tex., recently elected the following officers: Col. Cal C. Chambers, president; R. S. Bradshaw, first vice president and treasurer; J. O. Klein, vice president; H. H. Brien, vice president and sales manager; and E. N. Freel, secretary.

* * *

Index of foundry equipment orders for April, according to a report of the Foundry Equipment Manufacturers association, Cleveland, was 192.3 as compared with 243.4 in March, and 146.0 in April 1939. Index of shipments was 154.1 as compared with 179.0 in March and 131.0 in April, 1939.

RAW MATERIAL PRICES
May 18, 1940

Iron	
No. 2 foundry, Valley	$23.00
No. 2 Southern Birmingham	19.00
No. 2 foundry, Chicago	23.00
No. 2 foundry, Buffalo	23.00
Basic, Buffalo	22.00
Basic, Valley	22.50
Malleable, Chicago	23.00
Malleable, Buffalo	23.50
Charcoal iron, furnace	27.00
Coke	
Connellsville beehive premium	$5.75 to $6.30
Wise county beehive coke	5.00 to 5.25
Detroit by-product delivered	11.00
Scrap	
Heavy melting steel, Valley, No. 2	$17.00 to $17.50
Heavy melting steel, Pittsburgh, No. 2	17.00 to 17.50
Heavy melting steel, Chicago, Auto No. 2	14.00 to 14.50
Stove plate, Buffalo	14.50 to 15.00
Stove plate, Chicago	10.50 to 11.00
No. 1 cast, mchy., New York	14.50 to 15.00
No. 1 cast, mchy., Chicago	15.50 to 16.00
No. 1 cast, Pittsburgh	18.50 to 19.00
No. 1 cast, Philadelphia	20.00 to 20.50
No. 1 cast, Birmingham	15.50
Car wheels, iron, Pittsburgh	20.00 to 20.50
Car wheels, iron, Chicago	18.00 to 18.50
Railroad malleable, Chicago	20.50 to 21.00
Malleable, Buffalo	19.50 to 20.00
Nonferrous Metals	**Cents per pound**
Castings copper, refinery	11.12½
Straits tin	53.50
Aluminum, 99 per cent	19.00
Aluminum, No. 12 (Secondary, standard)	13.75 to 14.00
Lead, New York	5.00
Antimony, New York	14.00
Nickel, electro	35.00
Zinc, East St. Louis, Ill	5.85

Adventures of Bill

(*Concluded from page* 90)

of advice on his personal problem is not easy to answer. With all the best intention in the world I should hesitate to say 'do this' or 'do that.' If the life span extended over several hundred years a man would have a chance to investigate a reasonable number of occupations. According to the ordinary law of averages he finally would be sure to fall into a niche where he would be happy and contented. Unfortunately, our time is limited. We have little time for experimenting with many jobs. Then there is the element of chance or luck which may nullify all efforts, or may bring opportunities for affluence, ease and comfort. For thousands of years human beings have been struggling for a solution to the problem of how to succeed in life. Up to the present no formula has been developed to fit all cases. Individuals are as diversified as yale locks. Practically every person is familiar with lessons, sermons, books and miscellaneous literature on this subject. The net result is that a man is up against a blank wall when he attempts to chart a course for the future.

"My own personal opinion is that it does not matter much where or how a man commences his industrial life. Every occupation has innumerable by paths. Chance, luck, fate, force of circumstances or deliberate intent may set his feet on any one of these paths. The path may lead to success or failure. Unfortunately no person can foretell the future. The path may lead to an entirely new field in which the traveler has to adapt himself to new conditions. However, in all instances, a great deal depends on a man's mental and to some extent physical equipment. To succeed he must have ambition, initiative, ability to concentrate. He must be able to stand on his own feet and be ready to accept trials and disappointments in a philosophical spirit.

"Leaving generalities to one side and considering this specific case, I should say that having spent so many years laying a foundation, it would be advisable to continue. Study all branches of the foundry business and get ready for promotion to any of the executive positions. Material reward is as promising as in any other branch of the industrial field.

"In regard to taking up journalism or advertising, he may have a distinct flair in that direction. If that is the case, naturally he would be more contented at that kind of work. However, the desire to enter a certain field and the ability to perform in that field may be horses of entirely different colors. That point can be determined only by actual trial."